

New records of marine Gastrotricha from the French coasts of Manche and Atlantic

I. Macrodasysida, with descriptions of seven new species

by Jacek KISIELEWSKI

Abstract. — Twenty-seven species of Macrodasysida were found in the regions of Roscoff (English Channel) and Arcachon (Eastern Atlantic), seven following being new : *Megadasys minor*, *Urodasys roscoffensis*, *Turbanella multigitata*, *Thaumastoderma renaudae*, *Acanthodasys arcassonensis*, *Diplodasys caudatus* and *D. swedmarki*. Three other species, *Cephalodasys maximus*, *Mesodasys laticaudatus* and *Tetranchyroderma coeliopodium*, are reported for the first time from French coasts. *Xenodasys sanctigoulveni* found at type locality is redescribed and synonymy of *Chordodasys* with *Xenodasys* is discussed. *Paraturbanella microptera* is synonymized with *P. teissieri*, while the synonymy of *Thiodasys* with *Megadasys* is discussed on the basis of new data. New observations of *Dactylopodola weilli* from Arcachon support the view on its specific status. *Turbanella lutheri* has been found in freshwater beach seeps in Roscoff.

Résumé. — Vingt-sept espèces de Macrodasysida ont été récoltées dans les régions de Roscoff et d'Arcachon; parmi elles, sept sont nouvelles : *Megadasys minor*, *Urodasys roscoffensis*, *Turbanella multigitata*, *Thaumastoderma renaudae*, *Acanthodasys arcassonensis*, *Diplodasys caudatus* et *D. swedmarki*. Trois autres espèces, *Cephalodasys maximus*, *Mesodasys laticaudatus* et *Tetranchyroderma coeliopodium*, sont signalées pour la première fois sur les côtes françaises. *Xenodasys sanctigoulveni*, récolté dans la localité-type, est redécrit et la synonymie de *Chordodasys* avec *Xenodasys* est discutée. *Paraturbanella microptera* est mis en synonymie avec *P. teissieri* et la synonymie de *Thiodasys* avec *Megadasys* est discutée à partir de données nouvelles. Le statut spécifique de *Dactylopodola weilli* est confirmé par de nouvelles observations en provenance d'Arcachon. *Turbanella lutheri* a été trouvé dans les sources d'eau douce des plages de Roscoff.

J. KISIELEWSKI, Zakład Zoologii WSRP, ul. Prusa 12, 08-100 Siedlce, Poland.

INTRODUCTION

The marine fauna of Gastrotricha of French coasts is one of those that has been thoroughly studied. The first search of marine gastrotrichs in France was that of GIARD (1904a, b) and it resulted in describing two species from Ambleteuse. The studies conducted later were as follows : RENAUD-DEBYSER and SALVAT (1963) as well as D'HONDT (1968a, 1971a) have studied the fauna on the coasts of Flanders and Pas-de-Calais, KAPLAN (1958, 1961) of Calvados, LÉVI (1950, 1954, 1958), SWEDMARK (1950, 1954a, b, 1955, 1956a, 1967), SWEDMARK and TEISSIER (1967), DRAGESCO (1960), JOUIN (1966) and D'HONDT (1970, 1971a, 1974) of

northern part of Brittany, RENAUD-MORNANT (1971) on the continental shelf near Brest, D'HONDT (1968b) on the coasts of Charente-Maritime, Gironde, Landes and Basses-Pyrénées, SWEDMARK (1956a), RENAUD-DEBYSER (1963a, b, 1964), RENAUD-DEBYSER and SALVAT (1963), RENAUD-MORNANT (1967), RENAUD-MORNANT and JOUIN (1965), D'HONDT (1965, 1966a, b, c, 1971a) and RUPPERT (1979) in Bassin d'Arcachon, REMANE (1952, 1961) and DELAMARE DEBOUTTEVILLE (1953, 1954) in Pyrénées-Orientales, FIZE (1963) in Hérault, as well as SWEDMARK (1956b) and VIVIER (1974) in Provence. All these papers bring records of 90 identified species of gastrotrichs, including 58 macrodasyids and 32 chaetonotids. Among these species, 36 (23 macrodasyids and 13 chaetonotids) were described as new to science.

In summer 1982, I had the opportunity to study the marine gastrotrichs at Station Biologique de Roscoff and Institut de Biologie marine d'Arcachon. I have found 32 species known so far, 11 new species as well as some further poorly studied forms belonging to the genera *Macrodasyus* Remane, *Tetranchyroderma* Remane, *Thaumastoderma* Remane, *Platydasys* Remane and *Halichaetonotus* Remane being presumably also unknown to science. 27 species including 7 new ones belonging to the order Macrodasysida. Descriptions, supplementary morphological and anatomical data as well as occurrence characteristics are given in the present paper, whereas 16 species of Chaetonotida including 4 new are the subject of a separate work (KISIELEWSKI *in press*).

STUDY AREA AND METHODS

In the region of Roscoff (Finistère), gastrotrichs were sampled mainly in the proximity of the Station Biologique. Diverse sediments, from fine to coarse sand poor or rich in organic detritus, were collected from the channel which separated the village of Roscoff from Batz Island, and from two-kilometer long Bay of Aber bordering the western part of Roscoff. Some samples which contained clean, well-irrigated gravel were collected from the NW coast of Callot Island (Bay of Morlaix, about 5 km SE from Roscoff). The most interesting material was sampled from the submarine sand-bank Trezen ar Skoden, located on the open part of Manche, several miles NW of the Batz Island, at a depth of about 50 m. The shallow sand-bank described more detailly in BOILLOT (1960) as well as SWEDMARK and TEISSIER (1967), is mainly composed of mollusc-shell gravel.

In the region of Arcachon (Gironde), gastrotrichs were sampled in Bassin d'Arcachon (Eyrc beach), in the mouth of Bassin (dune Pilat, Banc d'Arguin and Cap Ferret — Camp Américain) as well as on the open Atlantic coast (Petit-Nice, south of Arcachon). The sediment was mainly fine, mostly clean but sometimes (Eyrc beach) gray or even black.

The sampling from the intertidal zone was made by hand and restricted to about the 5-centimetre thick upper layer of sediment. The material was kept in a laboratory in plastic bags 2 or 1 dcm³ in volume. The samples from the submarine sand-bank Trezen ar Skoden were taken by dredging and had a larger volume (50-200 dcm³). Gastrotricha living in freshwater springs which outflow on Roscoff beaches were sampled from the depth of the source itself after removing 30-50 cm thick upper sand layer at low water (when the seep was not covered with marine water). This kind of samples was kept in laboratory in plastic bags of 2 dcm³ volume. In all cases, gastrotrichs were extracted everyday from the substratum surface during a period of five days to three weeks after sampling. The animals reaching the surface in result

of decreasing of oxygen contents were captured during subsequent extractions. $MgCl_2$ was used before extraction, in solution of 7% for animals living in marine water, and 1% for freshwater spring gastrotrichs. Type specimens were fixed in 4% formalin, mounted in 2:1 mixture of glycerin and 10% formalin neutralized and salt, and then sealed with glyceel.

Family LEPIDODASYIDAE Remane, 1927

Cephalodasys maximus Remane, 1926

LOCALITIES : Manche : Bay of Aber, near Station Biologique; fairly abundant in fine and medium-grain-sized sand being gray or black, on the beach level between M.T.L. and M.L.W.N.T. — Atlantic : Arcachon, Eyrac beach and Pilat dune; abundant in fine black sediment at level between M.L.T. and L.W.L.

DISTRIBUTION : Baltic (REMANE, 1926, 1927; ROSZCZAK, 1939; FORNERIS, 1961), North Sea (REMANE, 1927; TEUCHERT, 1968; SCHMIDT and TEUCHERT, 1969) and Northern Ireland (BOADEN, 1966). Never recorded from France.

My specimens had usually 5 pairs of anterior adhesive tubules and 11-16 pairs of lateral ones (including 2-5 pairs on the pharyngeal region). The number of caudal adhesive tubules was about 22, occasionally up to 28. A median space between them was smaller than shown on the REMANE's figure, or was lacking at all.

Mesodasys laticaudatus Remane, 1951

LOCALITIES : Manche : Roscoff, Bay of Aber and channel of Batz Island near Station Biologique; abundant in fine, medium and coarse sand, usually rich in organic detritus, between M.T.L. and M.L.W.S.T.

DISTRIBUTION : Baltic (REMANE, 1951; FORNERIS, 1961), North Sea (FORNERIS, 1961; TEUCHERT, 1968; SCHMIDT and TEUCHERT, 1969), Mediterranean Sea (WILKE, 1954), Atlantic coast of USA (HUMMON, 1974*b*; THANE-FENCHEL, 1970). New to the fauna of France.

The specimens found were 800-1150 μm long when freely swimming, but could lengthen up to 1300 μm when were adhering to the sand. Pharynx was 250-340 μm long. Anterior adhesive tubules were 6.5-7 μm long and their number (12-18) was higher than reported by REMANE (1951). They were distributed irregularly in 2-3 transverse rows rather than in only one. The lateral adhesive tubules, 6-8 μm in length, occurred in maximum number of 50 pairs. There were 15-22 caudal tubules of unequal length, the external tubules being longer than those which were located on the middle part of lobe edge (up to 9 μm compared with 4.5 μm).

Megadasys minor sp. nov.

(Fig. 1 a-f)

LOCALITY : Manche : channel of Batz Island near Station Biologique ; abundant in fine and medium sand, usually gray or black, less common and in smaller number in clean coarse sand. It occurs mainly between M.L.W.N.T. and M.L.W.S.T., occasionally at M.T.L.

TYPE SPECIMENS : Holotype, a mature specimen collected on August, 16, 1982, deposited in MNHN Paris Collections (ref. n° UC 58). Three paratypes are kept in the author's collection.

ETYMOLOGY : From the latin *minor* = less, referring to smaller body size than that of the two other species previously known in the genus.

DIAGNOSIS : *Megadasys* with body 1150-1700 μm in length. Caudal lobe transverse-oval in shape, does not tend to form posterior depth. A row of 13-22 adhesive tubules running across the ventral lobe side. A paired row of lateral tubules ; three first pairs of tubes placed ventrally. Some additional tubules dorsally on the terminal trunk region. A pair of ventral ciliary bands along the whole body except for the rear trunk. Spermatozoon about 110 μm long, with long and finely spiraled head.

DESCRIPTION

The length of freely swimming animal is 1150-1700 μm . The body length : body width ratio amounts about 25. The body is only weakly flattened, and with anterior region somewhat narrower than the rest. The posterior body end is markedly separated from the trunk and has the form of a short and wide oval lobe.

A separate group of anterior adhesive tubules is lacking. Instead, three first pairs of tubules belonging to the lateral rows are inserted more ventrally, whereas all remaining tubules are located on the lateral body sides. Apart from a paired row of lateral tubules, a supplementary paired row of tubes occurs on the dorsal side of posterior trunk region. The distribution of tubules on the rear trunk region is quite irregular, both in lateral and dorsal rows. In all, several dozens of pairs of lateral tubules occur along the whole body, including about 18 pairs located on the pharyngeal region. The tubes are short (4-6 μm long), rather thick and do not bear tactile cilia. The caudal lobe is provided with a transverse row of adhesive tubules. The row extends from a lateral lobe side through ventral surface to another lateral side and consists of 13-22 tubules 6-7 μm long. The body ciliation consists of two narrow bands of cilia which are wide apart and extend from the mouth region along the whole body except for the posterior trunk part where the ciliature starts to be less regular and then completely vanishes. There are numerous tactile cilia on the lateral and dorso-lateral sides of the whole body except for the caudal lobe. The epidermal glands are abundant ; the pharyngeal body region contains at least 15 pairs of them.

The buccal cavity is as wide as the pharynx or somewhat wider, 10 μm long and non-cuticularized. The pharynx is 260-315 μm long, with pores located near to the end. The anus is ventral and occurs just in front of caudal lobe. The anatomy of reproductive organs corresponds fully to BOADEN's (1974) description of "*Thiodasys*" *sterreri*. A paired testis begins at the pharyngointestinal junction and is located laterally. Vasa deferentia join at the

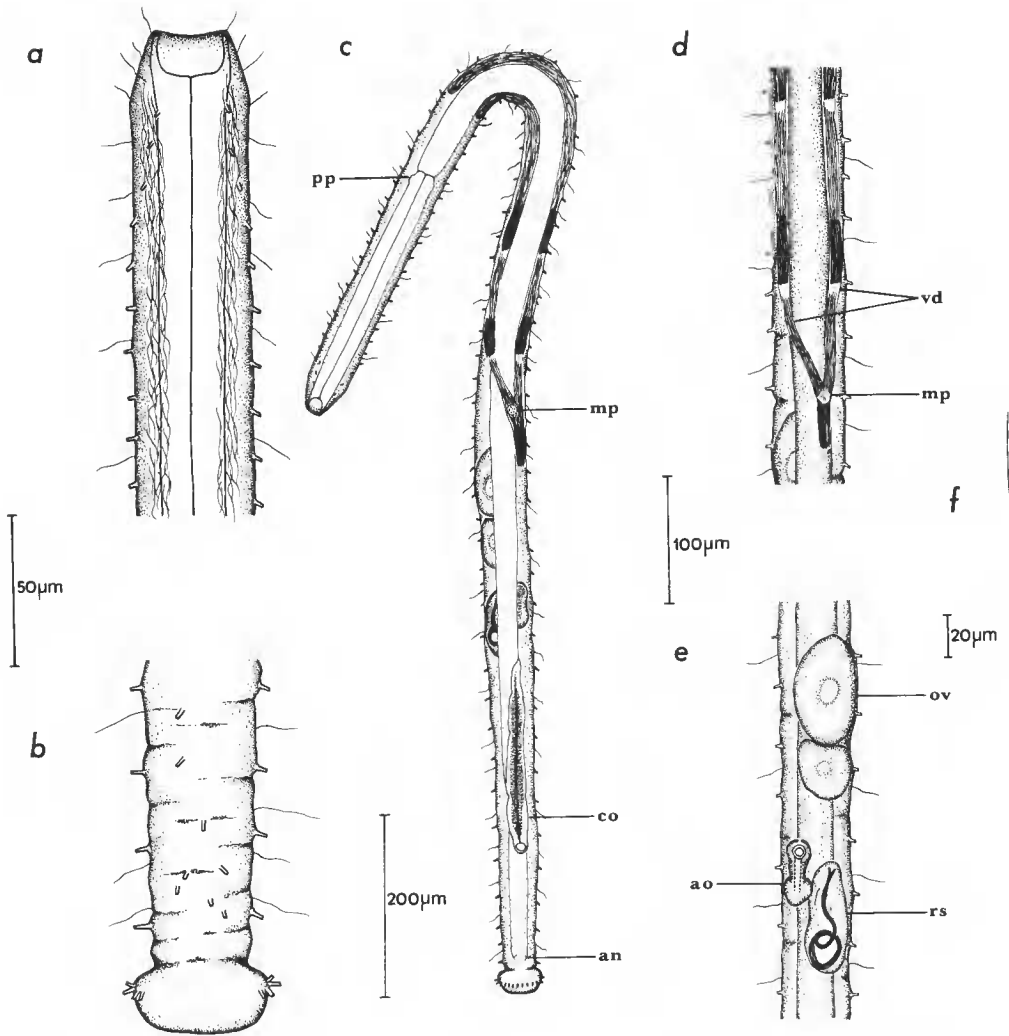


FIG. 1 a-f. — *Megadasys minor* sp. nov. : a, ventral view of anterior body region; b, dorsal view of posterior body region; c, general view, from ventral (ventral ciliature not marked); d, anatomy of anterior trunk region, from ventral; e, anatomy of middle-trunk region, from dorsal; f, spermatozoon. an = anus; ao = anterior organ; co = caudal organ with posterior ventral pore; mp = ventral male pore; ov = ovum; pp = pharyngeal pore; rs = receptaculum seminis with bundle of sperm; vd = vasa deferentia.

mid-trunk and open to the exterior ventrally, slightly left from the body midline. Each testis contains usually a bundle of spermatozoa, whose heads are directed backwards. Two further bundles occur typically in vasa deferentia and are partly interweaved with one another in the joint part of duct. The spermatozoon is about $110\mu\text{m}$ long, including $36\text{--}41\mu\text{m}$ long finely spiraled head. A bundle of sperm was seen to move. The mature eggs are located dorsally at the mid-trunk region, posterior to the male pore. The frontal organ, female in character,

consists of a long receptaculum and a short canal which opens on the dorsal body side. The posterior organ, having uncertain function, is in form of an elongated thick-walled canal with terminal ventral pore.

DISCUSSION

Principal features of *M. minor* sp. nov., the organisation of sexual system in particular, are in accordance with those of "*Thiodasys*" *sterreri*, the species described by BOADEN (1974) from Northern Ireland. Several months before BOADEN's paper was published, SCHMIDT (1974) described a large macrodasyid found in Galapagos and named it *Megadasys pacificus*. Both gastrotrichs have the following characteristics in common : very narrow and unusually long body, similarly shaped caudal lobe, lack of a separate group of anterior adhesive tubules, similar number and distribution pattern of caudal tubes, same location of paired testis and vasa deferentia as well as presence of a paired ovary and a strongly elongated bursa which occurs on the posterior body region. Some less important similarities will be discussed later. SCHMIDT did not have the opportunity to observe more details of the organisation of genital organs in *M. pacificus*, that makes impossible to compare the location and structure of the receptaculum seminis (the anterior organ) in both species. As far as the pharyngeal pore location is concerned, there is a distinct difference between descriptions of *M. pacificus* and "*Thiodasys*" *sterreri*. In the later species, they are placed terminally (see BOADEN's drawing), which is in full accordance with my observation of *M. minor* sp. nov. According to descriptions of *M. pacificus*, the pharyngeal pores are located at 4/5 of the pharynx length, but at 3/4 according to SCHMIDT's drawing. Considering numerous features in common listed above, both gastrotrichs should be regarded as congeneric. An actual position of pharyngeal pores in *M. pacificus* should be reexamined, since they are located terminally in all macrodasyids with only exception of some Macrodasysidae. The name *Megadasys* Schmidt, 1974, is valid for the genus in question as a senior synonym. It should be stressed here, that *Thiodasys* Boaden has been already synonymized with *Megadasys* by HUMMON (1982), however, without any comment. Thus, the following species belong to the genus *Megadasys* : *M. pacificus* Schmidt, 1974 (type species), *M. sterreri* (Boaden, 1974) n. comb. and *M. minor* sp. nov.

The genus *Megadasys* is characterized by the following features :

- body strongly elongated, 20-25 times as long as its width only weakly flattened and markedly contractile ;
- head region connected with next body part without any constriction ;
- caudal lobe transverse-oval or slightly heart-shaped ;
- distinct group of anterior adhesive tubules absent ;
- numerous short lateral tubules along the whole body, they do not bear any tactile cilia ; a dorsal paired row of tubules may also occur ;
- many short adhesive tubules distributed in a transverse row along the posterior edge or across ventral side of caudal lobe ;
- abundant tactile cilia along the whole body ;
- bands of scattered cilia isolated by wide median space on the pharyngeal region, on the trunk less regular ciliature vanishing gradually in its posterior part (not satisfactorily studied in *M. pacificus*) ;

- no cuticular formations on the body;
- exceedingly abundant epidermal glands or vacuolated cells;
- mouth narrow, non- or weakly cuticularized;
- pharyngeal pores terminal (for *M. pacificus* see discussion above);
- anus ventral, located just anterior to caudal lobe;
- paired testis beginning at the pharynx-intestinal junction, vasa deferentia extending backward and opening jointly on the ventral side in mid-trunk region;
- penis lacking;
- ovary paired, eggs maturing forward in a cavity above intestine;
- receptaculum seminis (the anterior organ) elongated, opening asymmetrically to the exterior on the dorsal body side; spermatozoa transferred to partner in bundles (unknown in *M. pacificus*);
- strongly elongated and cylindrical caudal organ (of unclear function) with terminal ventral pore; its anterior region usually granulated.

Apart from the features mentioned above, all three known species of the genus tend to live among sediment rich in organic detritus.

M. minor sp. nov. differs from *M. pacificus* and *M. sterreri* in having smaller body size (body length of compared species is 3000-3500 μm and 1700-3000 μm respectively). Its row of posterior adhesive tubules extends across ventral side of caudal lobe, whereas it is situated along posterior lobe edge in both remaining species.

Family MACRODASYIDAE Remane, 1926

Macrodasys caudatus Remane, 1927

LOCALITY : Manche : Roscoff, channel of Batz Island near to Station Biologique; in rather small number in clean varying from fine to coarse sand, between M.T.L. and M.L.W.S.T.

DISTRIBUTION : Found in many sites along the European coasts as well as on the Atlantic coast of USA (HUMMON, 1968, 1974*b*, 1975) and India (GANAPATI and CHANDRASEKHARA RAO, 1967; CHANDRASEKHARA RAO and GANAPATI, 1968*a*; CHANDRASEKHARA RAO, 1969; BALAKRISHNAN NAIR and GOVINDAN KUTTY, 1974). French coasts : Ambleteuse (D'HONDT, 1968*a*), Authie (RENAUD-DEBYSER and SALVAT, 1963), Roscoff (SWEDMARK, 1956*a*; DRAGESCO, 1960; D'HONDT, 1970), Bassin d'Arcachon (RENAUD-DEBYSER and SALVAT, 1963; D'HONDT, 1965; 1966*c*), Hossegor (D'HONDT, 1968*b*) and Marseille (SWEDMARK, 1956*b*).

Urodasys roscoffensis sp. nov.

(Fig. 2 a, b)

LOCALITY : Manche : Roscoff, channel of Batz Island; three mature specimens found in fearily clean, fine and medium sand at M.L.W.S.T.

TYPE SPECIMENS : Holotype, a mature specimen collected on August, 7, 1982, deposited in MNHN Paris Collections (ref. n° UC 59). A mature paratype is kept in the author's collection.

ETYMOLOGY : From the geographic name Roscoff, the type-locality.

DIAGNOSIS : Simultaneously hermaphroditic *Urodasys* 400-630 μm in length (excluding about 530 μm long tail). A pair of testis, the left hand side tending to be the larger. Cuticularized stylet-like sexual structure absent. Pestle-organ absent. Four to seven pairs of lateral adhesive tubules distributed irregularly along the pharyngeal and intestinal region; the tubules longer and thinner than caudal ones. Two to four pairs of additional tubes dorsally. Uniform ventral ciliary area along the pharyngeal region, but separated ventral ciliary bands along the anterior half of trunk.

DESCRIPTION

Body length, excluding the tail, about 530 μm long, ranges from 400 to 630 μm . The pestle organ is absent. Ventral ciliature consists of an uniform area along the pharyngeal region and two separate bands along the anterior half of trunk. The body region posterior to the junction of vasa deferentia is free from ventral cilia. The ciliature occurs also on the dorsal head part, but its pattern is variable. Tactile cilia, which are particularly numerous on the pharyngeal region, arise from dorsal and lateral body sides. The anterior adhesive tubules are arranged in a paired longitudinal ventro-lateral row. Each row consists of 5-9 tubes 10-11 μm long. The lateral tubules occur in lateral and dorso-lateral rows and are variable in number and distribution. The dorso-lateral rows consist of 2-4 pairs of tubules and are distributed mostly on the pharyngeal region. The lateral rows include 4-7 pairs of tubules distributed mainly along the trunk. The tubes are relatively long (9-11 μm) and thin. Caudal tubules are shorter (4.5-5.5 μm) and usually thicker than trunk ones. There are about fifteen pairs of them. Similarly to the trunk tubules, the caudal ones may bear a short tactile cilia on their tops.

Mouth is somewhat subterminal. Pharynx is 185 μm long and has a pair of pores located at 1/7 from its end. The gut is typical of the genus, having a form of short blind sac. The body cavity behind the gut is filled with densely packed large vacuoles, whereas smaller vacuoles occur between the gut and lateral body wall. The vacuolation of body cavity was unmarked in one of the specimens studied. A small bag-like structure having ventral pore is located near the trunk rear. Paired testis and paired ovary were simultaneously present in all three animals studied. The left testis was considerably larger than the right one in two specimens, however, an animal showed both testis of almost equal size. Vasa deferentia extend backward, and join at 2/3 of the trunk length, while a common duct turns forward and opens ventrally at the level of the gut end. The opening is preceded by a small vesicle located slightly on the left body side. Cuticularized stylet-like structures were not observed. Ova mature in dorsal part of body cavity.

DISCUSSION

The genus *Urodasys* Remane shows an interesting variability in developmental relations of gonads. Amongst eight species described so far, *U. viviparus* Wilke, 1954, is an obligate parthenogenetic, being in addition viviparous (WILKE, 1954; SWEDMARK, 1956b). *U. mirabilis* Remane, 1926, shows a considerable protandric hermaphroditism (REMANE, 1926; FORNERIS, 1961; TEUCHERT, 1968) and the remaining six species are simultaneous hermaphrodites. In the

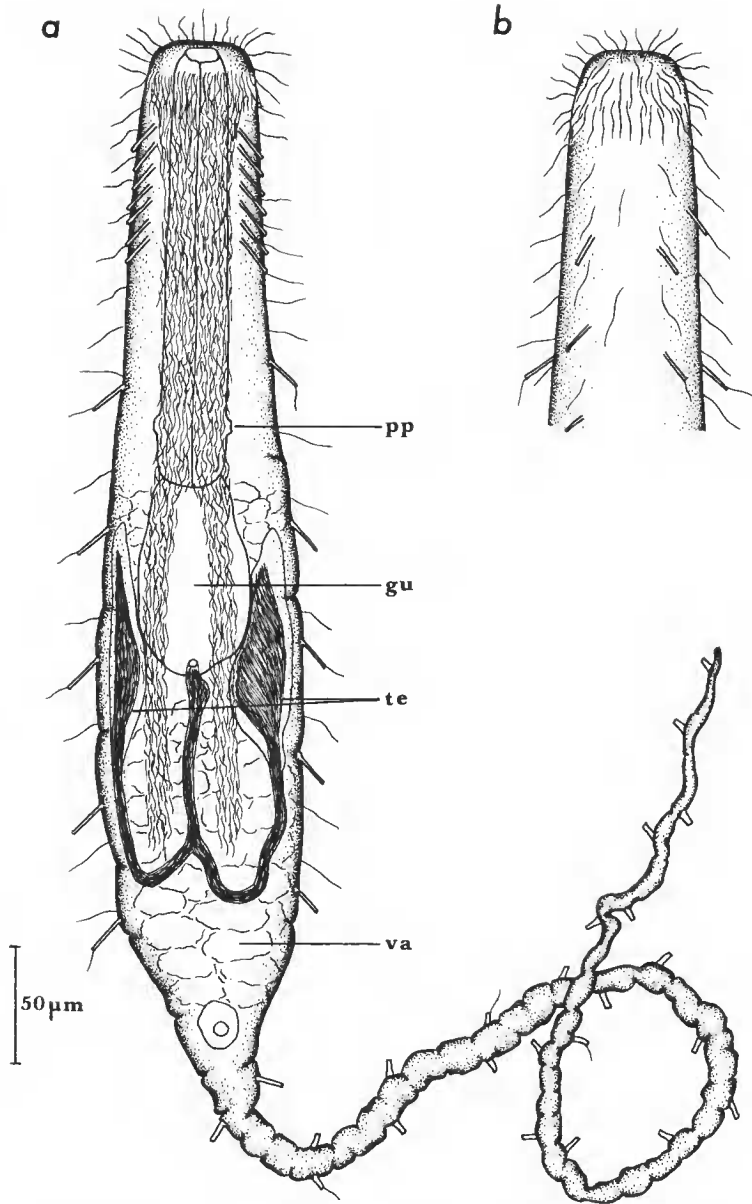


FIG. 2 a-b. — *Urodasys roscoffensis* sp. nov. : a, general view, from ventral; b, dorsal view of anterior body region.
gu = gut; pp = pharyngeal pore; te = testis; va = body cavity vacuole.

above mentioned *U. mirabilis* the left testis is larger than the right one (REMANE, 1926; TEUCHERT, 1968) and it seems that the testes of *U. elongatus* Renaud-Mornant, 1969, tend also to be of unequal size (see fig. 1 in RENAUD-MORNANT, 1969). The five remaining species described by SCHÆPFER-STERRER (1974), namely *U. cornustylis*, *U. remostylis*, *U. calicostylis*, *U. nodostylis* and *U. spirostylis* have only the left testis, showing in addition the presence of strongly cuticularized accessory reproductive organ interpreted by the author as stylet (SCHÆPFER-STERRER, 1974). The newly-described *Urodasys* species from Roscoff is hermaphroditic, has a paired testes and no cuticularized accessory structures, like *U. mirabilis* and *U. elongatus*, with left testis usually larger than right one, however, this character is not constant among the population. *U. roscoffensis* sp. nov. differs from *U. mirabilis* by its smaller size (body length excluding tail 400-630 μm compared with 800 μm), in bearing lateral and dorso-lateral adhesive tubules on the pharyngeal region, nearly half as numerous lateral tubes as well as different pattern of ventral ciliation (*U. mirabilis* has an uniform ciliary area along the whole body). *U. roscoffensis* differs from *U. elongatus* in being of a little larger size (body length of *U. elongatus* reaches 350 μm), in having caudal tubules shorter and thicker than trunk ones (the compared species has terminal tail tubes considerably longer) as well as in bearing different ventral ciliature (*U. elongatus* lacks cilia behind the pharyngeal region).

Family DACTYLOPODOLIDAE Strand, 1929

***Dactylopodola baltica* (Remane, 1926)**

LOCALITIES : Manche : Roscoff, Bay of Aber and channel of Batz Island ; rather not abundant in fine, medium and coarse sand, both clean and rich in organic detritus, between M.T.L. and M.L.W.S.T.

DISTRIBUTION : Known from many stations along the coasts of northern European seas (Baltic, North Sea, Manche) and also from South Florida (THANE-FENCHEL, 1970). French coasts : Calvados (KAPLAN, 1958) and the region of Roscoff (LÉVI, 1950; SWEDMARK, 1950, 1955*b*, 1956*a*; DRAGESCO, 1960; JOUIN, 1966; D'HONDT, 1970).

Body length in my specimens ranged from 290-357 μm , and pharynx length from 58-71 μm . There were 4-5 pairs of anterior adhesive tubules, the shortest being 7.5 μm in length and the longest 14 μm . The distribution and number of lateral tubules were typical of the species. 6-8 pairs of caudal adhesive tubules were present the second and third inner ones being the longest (9-13 μm).

***Dactylopodola cornuta* (Swedmark, 1956*a*)**

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; fairly abundant.

DISTRIBUTION : North Sea (FORNERIS, 1961; D'HONDT 1968*a*; SCHMIDT and TEUCHERT, 1969), the coast of Scotland (MCINTYRE and MURISON, 1973; HUMMON, 1976), Manche and

Western Atlantic. French coasts : Pas-de-Calais (D'HONDT, 1968a), Roscoff (SWEDMARK, 1956a; SWEDMARK and TEISSIER, 1967), Bassin d'Arcachon (D'HONDT, 1966a, *D. c. brevis*).

Trezen specimens are 277-297 μm long, and have 58-64 μm long pharynx, the head width up to 54 μm , excluding the 15 μm long tentacles. In contrast with SWEDMARK's (1956a) data and in agreement with observations by FORNERIS (1961), four pairs of anterior adhesive tubules occur. As in FORNERIS' specimens, tubules of two pairs are longer (13-15 μm) and the two remaining ones shorter (6-9 μm), with a range of 8 to 15 μm for five pairs of lateral tubules. Four first tubes of every body side are directed backward while the rearmost ones always slightly forward. Among four adhesive tubules borne from each caudal lobe, two median ones are longer (13 μm) and markedly separated from one another, whereas two remaining ones shorter (4-8 μm) and adjoining to median tubules. Cross-striated longitudinal muscles were easy to observe along the whole body.

***Dactylopodola weilli* (d'Hondt, 1965)**

(Fig. 3 a, b)

LOCALITIES : Atlantic : Bassin d'Arcachon, Eyrac beach, Pilat dune and Cap Ferret (Camp Américain); frequent and sometimes very abundant in fine homogeneous sand from clean to black, between M.T.L. and L.W. level. Petit-Nice; not very abundant in clean fine sand at level of H.W.

DISTRIBUTION : Described from Bassin d'Arcachon (D'HONDT, 1965, 1966c, 1971) and not recorded so far elsewhere.

With the study of numerous specimens of this gastrotrich, it is possible to supplement to the original description. Body length 243-319 μm . The head is cone-shaped and has conspicuous constriction on the level of insertion of anterior adhesive tubules. The five paired anterior tubes, in all mature animals, are not arranged in a transversal but in a longitudinal row. The first two anterior lateral tubules are 12 μm long, the third ones 6-7 μm , and two rearmost ones 4-5.5 μm long. There are five pairs of lateral adhesive tubules, the distributional pattern of them being 1-1-1-2. The third tubule is constantly well separated from the two posterior ones. There are five (less frequently four) pairs of caudal adhesive tubes. The second and third ones, counting from the exterior, are markedly longer than the others (7-8 μm instead 3.5-6 μm) and separated from one another.

The organisation of genital system is typical of the genus. Spermatozoa are long, relatively thick and not spiraled. The posterior parts of both testes and the wide ventral canal which joins these organs are filled with numerous structures having oval outline and flat or concave surface (fig. 3 b). These abundant and regularly occurring structures are spermatocytes or spermatids rather than degenerated testis cells are REMANE (1926) has suggested (see also WILKE, 1954).

D. weilli was described by D'HONDT (1965) from Bassin d'Arcachon. The author has indicated that more individualised head, slender body and a separation of the third lateral adhesive tubules from two rearmost ones are characters which differentiate this species from *D. typhle* (Remane, 1927). LUPORINI *et al.* (1973) described from Mediterranean Sea a

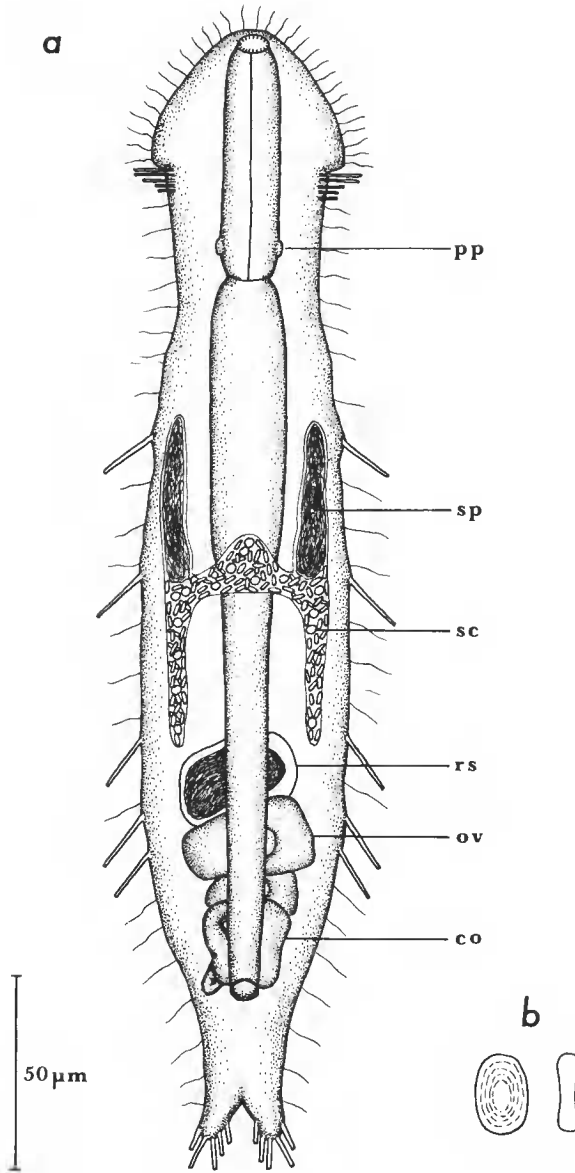


FIG. 3 a-b. — *Dactylopodola weilli* : a, general view, from ventral (locomotory cilia not marked); b, a spermatocyte (?) seen from above (left) and laterally (right). co = caudal organ; ov = ovum; pp = pharyngeal pore; rs = receptaculum seminis; sc = spermatocyst (?); sp = spermatocyst.

Dactylopodola with the third lateral tubule separated from the fourth and fifth, however, they identified it as *D. typhle*. The authors argued that *D. weilli* had many characters in common with the later species and differences were rather subjective, thus, the specific status to *D. weilli* was not justified. It is true that both forms show many important similarities, however, specimens from Arcachon, both studied by D'HONDT more than twenty years ago and mine found in 1982, have some distinct features. Apart from different head shape and lateral tubule distribution pattern, an additional feature should be taken in consideration, namely the disposition of anterior adhesive tubules. The tubules of *D. typhle* are distributed in a paired transverse row, that can be seen on the drawings of REMANE (1927), of LUPORINI *et al.* (1973) and is mentioned in ZANEVELD (1938). The specimens from Arcachon, mine in particular, have an arrangement of their anterior tubules clearly longitudinal. The *Dactylopodola* found by LUPORINI *et al.* shows intermediate features between typical *D. typhle* and the Arcachon form. Apart from the different disposition of the anterior tubules, it differs from the last form in showing shorter and thicker head and in having the third and fourth caudal adhesive tubules (counting from exterior) the longest and separated from one another, instead of the second and third (constant character of my specimens). The separate status of *D. weilli* is not obvious, however, the present knowledge on intraspecific variability among *Dactylopodola* does not give the right to synonymize it with *D. typhle*.

Family TURBANELLIDAE Remane, 1925

Turbanella cornuta Remane, 1925

LOCALITY : Atlantic : Bassin d'Arcachon, Eyrac beach ; not abundant in fine black sand at L.W.L.

DISTRIBUTION : Recorded from many stations along European coasts as well as the Atlantic beaches of USA. French coasts : the North Sea beaches and Pas-de-Calais (D'HONDT, 1968*a*), Calvados (KAPLAN, 1958), Roscoff (LÉVI, 1950; SWEDMARK, 1950, 1955*b*, 1956*a*; DRAGESCO, 1960; D'HONDT, 1970, 1974), Bassin d'Arcachon (RENAUD-DEBYSER, 1963*a*, *b*; RENAUD-DEBYSER and SALVAT, 1963; D'HONDT, 1971), Golfe de Gascogne (D'HONDT, 1968*b*) and Marseille (SWEDMARK, 1956*b*).

Turbanella lutheri Remane, 1952

LOCALITIES : Manche : Roscoff, far into Aber; rather rare amongst coarse sand in the depth of a freshwater seep which outflows on the beach a little below the level of M.H.W.N.T. The harbour of Roscoff; very abundant among gravel on the depth of freshwater seep which outflows a little below the level of M.H.W.N.T. The most abundant member of the whole meiofauna on the last site; amongst associated gastrotrichs, only a few specimens of *Chaetonotus* sp. being relatively close to *Ch. maximus* Ehrenberg and *Ch. similis* Zelinka were found.

DISTRIBUTION : Baltic (REMANE, 1952; GERLACH, 1954; JANSSON, 1968; KISIELEWSKI, 1975), Western Swedish coast (KARLING, 1954), the coast of Norway (SCHMIDT, 1972), North Sea (FORNERIS, 1961) and Manche. French coasts : Roscoff (D'HONDT, 1970).

T. lutheri has been found already in low-salinity environment several times. It has been reported from Finland (Baltic) where it occurred at salinity lower than 5‰ (REMANE, 1952). I found it also in the same sea near Gdansk (KISIELEWSKI, 1975) where the salinity ranges from 7-8‰. The salinity measurements taken by myself in the fresh water seep of Roscoff beaches usually ranged from 2 to 3‰. However, *T. lutheri* was the most abundant not at the surface but in the depth of springs (30-50 cm below the surface), where the salinity was below 1‰, thus, in fresh water. In order to test if *T. lutheri* is entirely adapted to live in fresh water, I maintained a sample containing a water showing salinity < 1‰ in the laboratory during three weeks. At the end of this period, *T. lutheri* was as numerous as on the day of sampling, being represented in addition by animals of different age, from newly-hatched ones to bearing mature eggs. These observations reveal again that some macrodasyids had overcome physiological barrier to adapt to life in freshwater environment. Apart from this case, the description of the macrodasyid *Redudasys fornerise* from a Brazilian inland water body (KISIELEWSKI, *in print*), the finding of *Marinellina flagellata* in the Austrian river psammon (RUTTNER-KOLISKO, 1955; see also KISIELEWSKI, *in print*) as well as the record of *Turbanella cornuta* from a very low-salinity water in the Elbe estuary (RIEMANN, 1966) could be mentioned.

The *T. lutheri* specimens found in freshwater springs at Roscoff have their morphology and dimensions in accordance with REMANE's description. The free-swimming specimens reach 760 μm whereas the sessile ones attain 940 μm . The pharynx is 170-200 μm long. The mature animals have 6-9 pairs of anterior, 13-18 pairs of lateral (including 1-2 pairs along the pharyngeal region), 8 pairs of dorso-lateral and 8-11 (occasionally 6) pairs of caudal adhesive tubules.

***Turbanella multidigitata* sp. nov.**

(Fig. 4 a-c)

LOCALITIES : Manche : Roscoff, the mouth of Aber, W coast; abundant in fine clean sand at M.L.W.N.T.

TYPE SPECIMENS : Holotype, a mature specimen collected on August, 2, 1982, deposited in MNHN Paris Collections (ref. n° UC 60). Two paratypes are kept in the author's collection.

ETYMOLOGY : From the latin *multus* = much, and *digitus* = finger, referring to high number of anterior and caudal adhesive tubules.

DIAGNOSIS : *Turbanella* with 900-1230 μm body length. Head without protrusions or ocellar granules. Ventral "cirrata" tubes absent. Anterior adhesive tubules in number of 9-15 pairs. Lateral tubes arranged in three paired longitudinal rows, each consisting of about 30 tubules. Caudal lobes with 11-15 pairs of tubules, the first, second or third external ones being the longest. Small median caudal cone present.

DESCRIPTION

The body of freely swimming animals is 900-1230 μm in length and is relatively slender. The head bears neither protrusions nor ocelli. The anterior adhesive tubules being in number of 9-15 (usually 11-13) pairs are borne from typical movable feet. The tubules are thin and 9-

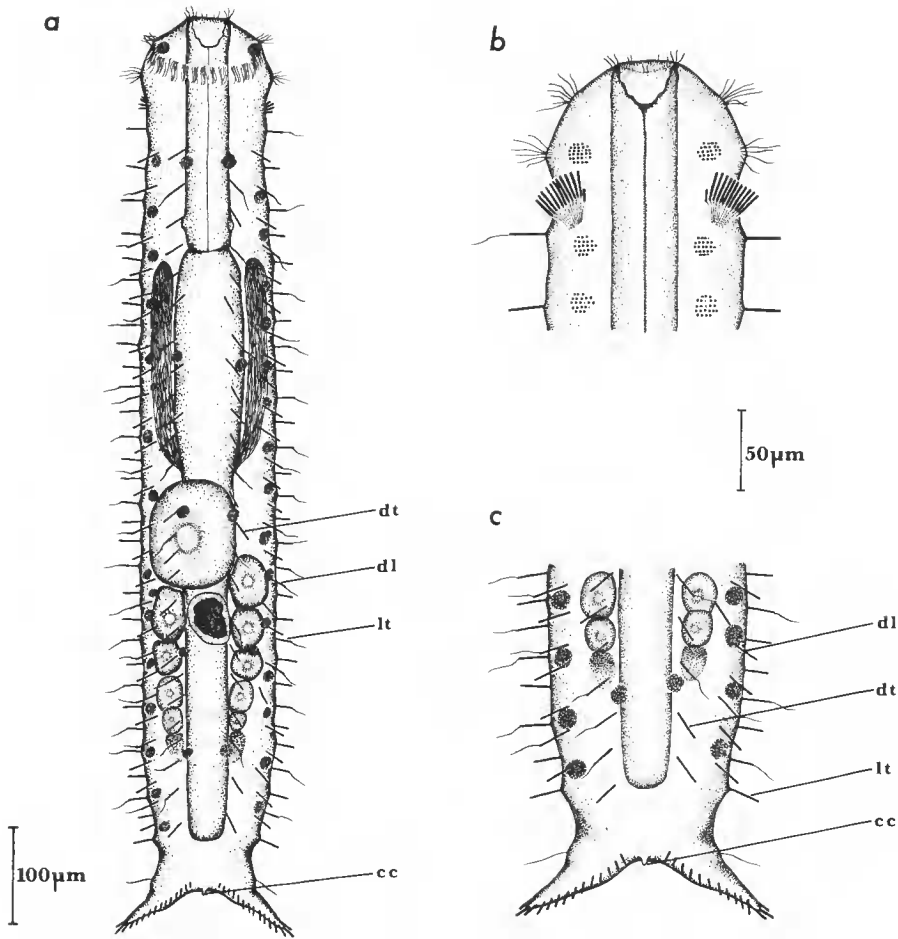


FIG. 4 a-c. — *Turbanella multidigitata* sp. nov. : a, general dorsal view; b, ventral view of anterior body region (locomotory cilia marked as points); c, dorsal view of caudal body region. cc = median caudal cone; dl = dorso-lateral adhesive tube; dt = dorsal adhesive tube; lt = lateral adhesive tube.

18µm long, usually reaching 10µm. The internal ones are typically half as long as the remaining ones and are inserted a little behind the others. Some external tubes project over the body margin when the feet are typically directed. The lateral adhesive tubules are unusually abundant. They are arranged in three paired longitudinal rows including dorsal, dorso-lateral and lateral one. Each row consists of about 30 tubules, 3-5 of them being located on the pharyngeal region. Excluding anterior and caudal ones, a total of 83-96 pairs of tubes were observed on the body of some specimens. The trunk tubules are thin, 16-24µm long (usually 19-21µm) and frequently bear cilia of variable length. Only few specimens studied almost lacked cilia connected with lateral tubules. There are 11-15 (13 on average) pairs of tubules on slender caudal lobes. The longest and thickest is the first, second or third external tube,

reaching the length of 10-14 μm . The inner tubules are inserted almost dorsally and are the shortest (4.5-7.5 μm). A small median cone is present. The dorsal cephalic ciliature consists of a transverse row of tufts running across the widest part of the head. Two additional tufts occur laterally; the mouth is also surrounded with irregularly distributed short cilia. The ventral ciliature consists of a paired longitudinal row of ciliary tufts. Numerous tactile cilia arise from the dorsal and lateral body side; two pairs of them are typically present on the caudal lobes.

The pharynx length ranges from 215-240 μm except for the pharynx of the largest specimen studied which reaches 277 μm (mouth cavity included). The mouth cavity is as wide as the pharynx and not cuticularized. The pharyngeal pores open between the dorsal and dorso-lateral rows of tubes about 30 μm ahead of the pharynx end. The anus is ventral, located about 45 μm anterior to caudal lobe base. The majority of epidermal glands is arranged in regular paired longitudinal rows running along the lateral body margin. A row consists of 20 or less glands filled with medium-sized vesicles. The reproductive organ anatomy is as described for *T. cornuta* (REMANE, 1925, 1926).

DISCUSSION

T. multidigitata sp. nov. is one of the largest member of the genus. Only three following *Turbanella* species show similar body size (all species reaching the body length of at least 800 μm are included) : *T. lutheri* Remane, 1952, *T. ocellata* Hummon, 1974, and *T. thiophila* Boaden, 1974. *T. multidigitata* differs from the three mentioned species in having more numerous anterior tubules (the number 4-5, up to 10 and 4-8 respectively is reported for those species) as well as in showing considerably higher number of lateral tubules, these being arranged in three paired longitudinal rows. Additional differences between the new gastrotrich and *T. lutheri* are the presence of the anal cone, longer and thinner lateral tubules as well as a different shape of caudal lobes. *T. multidigitata* differs from *T. ocellata* also in lacking ocelli and ventral "cirrata" tubules, whereas from *T. thiophila* in lacking cephalic appendages.

Paraturbanella armoricana (Swedmark, 1954b)

LOCALITIES : Manche : Roscoff, channel of Batz Island; common and sometimes numerous in fine, medium and coarse sand clean or enriched in organic detritus, at the level between M.L.W.N.T. and M.L.W.S.T.

DISTRIBUTION : Known only from Roscoff, where it has been recorded by SWEDMARK (1954b, 1955b, 1956a) and DRAGESCO (1960).

The specimens are in full accordance with the original description and some further details may be added. One of the mature specimens is 560 μm long, being smaller than reported previously by SWEDMARK (650 μm). There are 7 instead of 5 pairs of anterior adhesive tubules. The tubes are variable in length, averaging 6 μm long. The longest of the ventral foot tubules reaches only 15 μm (instead 35 μm) when measured without the basal region; the shorter one is 6 μm long. There are 11 pairs of caudal adhesive tubules. The caudal median cone is absent which is in accordance with the SWEDMARK's data. Many tactile cilia are never connected with

the adhesive tubes occurring along the whole body. The anatomy of reproductive system is as described for *T. cornuta* (REMANE, 1925, 1926), including a dorsal location of receptaculum seminis.

***Paraturbanella teissieri* Swedmark, 1954a**

P. microptera Wilke, 1954. n. syn.

LOCALITIES : Manche : Callot Island, NE coast ; in a clean gravel at M.T.L. Atlantic : Arcachon, dune of Pilat, Cap Ferret (Camp Américain) and Petit-Nice ; average abundance in fine clean sand between H.W.L. and M.T.L.

DISTRIBUTION : North Sea (SCHMIDT and TEUCHERT, 1969), Wales (BOADEN, 1963a, c, 1966), Northern Ireland (BOADEN, 1963b, 1966), Scotland (MCINTYRE and MURISON, 1973 ; HUMMON, 1976), Manche, French coast of Atlantic, Mediterranean Sea (WILKE, 1954 — *P. microptera* ; D'HONDT, 1973 ; TONGIORGI, 1975) and the Atlantic coast of USA (HUMMON, 1974b). French coasts : Ambleteuse (D'HONDT, 1968a), Roscoff (SWEDMARK, 1954a ; D'HONDT, 1970), Bassin d'Arcachon (RENAUD-DEBYSER, 1963a, b, 1964 ; RENAUD-DEBYSER and SALVAT, 1963 ; RENAUD-MORNANT and JOUIN, 1965 ; D'HONDT, 1965, 1966c), Hossegor (D'HONDT, 1968b).

The specimens found are 590-620 μ m long. The head shape is in full accordance with WILKE's drawing (1954) for *P. microptera*. There are 6 pairs of anterior and 6-10 pairs of caudal adhesive tubules. A clear median caudal cone connected to a typical epidermal gland is present. The number and sizes of epidermal glands are variable. The glands are usually arranged in a paired dorso-lateral row, about 50 (including 10 on the pharyngeal region) in a row, and in a paired dorsal row which extends along the digestive tract walls and consists of 20 pairs of glands (including 10 pairs on the pharyngeal region). However, more numerous and much smaller glands being irregular clusters of granules are distributed in irregular longitudinal rows are occasionally observed. As far as the organisation of genital system is concerned, large oocytes maturing dorsally and a dorsal receptaculum seminis with foreign sperm were observed.

SWEDMARK and WILKE have described almost simultaneously in 1954 two species belonging to *Paraturbanella* : *P. teissieri* from Brittany and *P. microptera* from Mediterranean Sea respectively. Both species were considered by their authors as the second within the genus and only differences from *P. dohrni* Remane, 1927, were included into discussion. Therefore, it seems that both authors were not aware of a second species which was being described simultaneously. All the later descriptions of gastrotrichs showing *P. teissieri* — *P. microptera* complex of features refer to *P. teissieri* and usually consider the presence of small pestle-organs as well as a sharp-edged head shape being closer to WILKE's than to SWEDMARK's picture (SCHMIDT and TEUCHERT, 1969). The possible synonymy of *P. teissieri* and *P. microptera* was discussed for the first time by SCHMIDT and TEUCHERT (1969) and an oversight of pestle-organ by WILKE was suggested. It should be stressed, that this organ has not been mentioned neither in the original description of *P. teissieri*, thus, its later finding could not be used as an argument for separating both forms. The diagnostic value of unequal size of median caudal

cone, which TONGIORGI (1975) indicates as one of differences between the species in question, seems to be also problematic. The most important features to differentiate between both gastrotrichs are larger body size, smaller number of anterior and caudal adhesive tubules as well as more numerous epidermal glands in *P. microptera*. A low number of anterior and variable number of caudal adhesive tubules as well as a variability in number and size of epidermal glands, which were observed by myself both amongst the populations from Roscoff and Arcachon, are the arguments against the separate status of *P. teissieri* and *P. microptera*. The range of body length given for *P. teissieri* in literature (480-700 μm) differs from the WILKE's data for *P. microptera* (1 mm), however, the last author neither mentioned how wide is the variability range of this character nor gave the number of specimens studied. Thus, it seems that only one species showing the complex of features of *P. teissieri* — *P. microptera* occurs along the West European coast. The name *P. teissieri* Swedmark, 1954a should be considered as valid since it was proposed several months before the WILKE's paper was published. Also a separate status of *P. mesoptera* Chandrasekhara Rao, 1970, which has been described from India and differs from the European form in having smaller body size (360-380 μm), higher number of anterior tubules and less numerous lateral tactile cilia, seems to be doubtful.

***Dinodasys mirabilis* Remane, 1927**

(Pl. I f)

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; fairly abundant.

DISTRIBUTION : Western Swedish coast (SWEDMARK and TEISSIER, 1967), North Sea (REMANE, 1927; CLAUSEN, 1967) and Manche. French coasts : Roscoff (LÉVI, 1950; SWEDMARK, 1950; SWEDMARK and TEISSIER, 1967).

One of the specimens found is 317 μm long, whereas the length of its pharynx reaches 105 μm . The population from Trezen ar Skoden differs from the REMANE's specimens as follows : the anterior paired tentacles which are borne dorsally on the base of mouth cone are long (32 μm) and tubular. Like in the specimens from Helgoland, the tentacle has distal bifurcation and is furnished with cilia. The largest lateral cephalic tentacles are 43 μm long and thicker than shown on the REMANE's figure. Their surface is cuticularized and the tops enlarged, truncate and furnished with cilia. I have often observed a scale-like thickenings on the middle-length of them. The lateral tentacles resemble those of *Xenodasys* rather than the cephalic protrusions of some *Turbanella* species. The anterior adhesive tubules are more numerous and occur usually in seven pairs (instead up to five pairs). The tubules are borne from very long and movable feet. The tubule length is differentiated, the longest being the two median tubules (up to 13 μm). Lateral tubules occur also in higher number, usually reaching 17 pairs (compared with 10 pairs). Well visible median caudal cone is present in the Channel specimens whereas it has not been recorded in the animals from Helgoland. Like in REMANE's specimens, 4-5 pairs of caudal adhesive tubules are present.

Xenodasys sanctigoulveni Swedmark, 1967

(Fig. 5 a-c; pl. I a-c)

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; only one specimen.

DISTRIBUTION : Known only from the station mentioned above (SWEDMARK, 1967).

Resulting from an intensive search, I have found only one dead individual of this interesting species. Complete external structures seemed to be preserved in the specimen studied, however, the appearance of body cavity suggested a partial desintegration of the tissues.

Body length about 295 μm , markedly narrower neck region separated head from trunk, two pairs of cephalic tentacles, antero-dorsal ones (corresponding with latero-median tentacles in the SWEDMARK's description) thin and 31 μm long, showing no articulation, no appearance of structures being composed with joined bristles. The lateral tentacles (fig. 5 c; pl. I b), which were 33 μm long, were thicker, had external articulation and irregularly rugged tops, like tentacles of *Dinodasys* Remane and, most of all, "*Chordodasys*" *riedli* Schöpfer-Sterrer, 1969, and "*Ch.*" *antennatus* Rieger *et al.*, 1974. 13 pairs of conspicuous prominences on the lateral trunk margins, each of them bearing an adhesive tubules 6 μm in length. Posterior body extremity deeply furcated; each branch bore three, thick, about 7 μm long adhesive tubules. Three pairs of anterior adhesive tubes originated from movable feet, tubes were very thick, 6 μm long and with rounded ends. Apparently, they corresponded with "muscles trifurqués" in the SWEDMARK's description and his figure 3B. A pair of elongated ventral "cirrata" tubes occurring on the mid-trunk region (fig. 5 a), these directed backward and presumably homologous with the second pair of ventro-lateral tubules in "*Chordodasys*" *riedli*.

Head covered with many polygonal cuticular plates, the dorsal ones being larger than the ventral one. Some of the plates, chiefly the ventro-lateral ones, densely scratched. A pair of longitudinal rows of oval or triangular scales occurred on the dorsal side of trunk (fig. 5 b; pl. I c). The scales which belong to the same row tend to assemble into pairs. The majority of scales bore thick and soft process which did not resemble any scale structure occurring in gastrotrichs with exception of those observed on supplementary trunk plates of *Diplodasys swedmarki* sp. nov. (see also comment on the dorsal "spines" of "*Chordodasys*" *riedli* in RIEGER *et al.*, 1974).

The anatomy was not satisfactorily studied because of partial decomposing of tissues. In particular, I was unable to state whether a chordoid organ occurred. A paired testis with clearly spiraled spermatozoa was well preserved. The longitudinal muscles were obviously cross-striated.

DISCUSSION

My specimen was found on the same station where *X. sanctigoulveni* was originally described. SWEDMARK (1967) had classified his species to the order Macrodasysida, however,

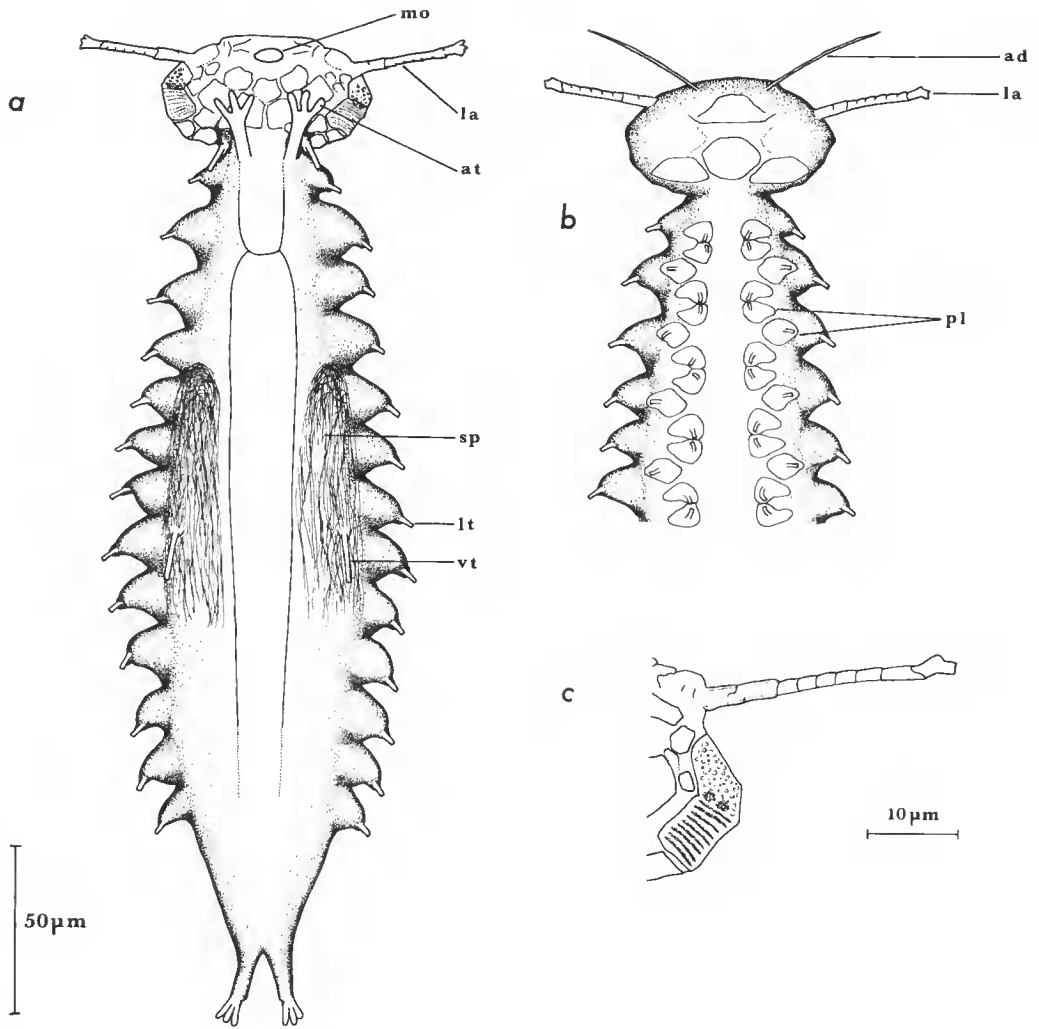


FIG. 5 a-c. — *Xenodasys sanctigoulveni*: a, general view, from ventral (locomotory cilia not marked); b, dorsal view of anterior body region; c, ventro-lateral part of head with lateral tentacle. ad = antero-dorsal cephalic tentacle; at = anterior adhesive tube; la = lateral cephalic tentacle; lt = lateral adhesive tube; mo = mouth; pl = dorsal plates with sensory (?) processes; sp = spermatozoa in testis; vt = ventral "cirrata" adhesive tube.

D'HONDT (1970) transferred *X. sanctigoulveni* to Chaetonotida (family Neodasyidae). The rightness of this transfer was also confirmed by HUMMON (1974a), however, the last author withdrew his opinion later (HUMMON, 1982). SCHÖPFER-STERRER (1969) has described from North Carolina a macrodasyid *Chordodasys riedli*, showing its close relation with *X. sanctigoulveni*. The author has indicated presence of a chordoid organ, anterior and ventro-lateral adhesive tubules, a pair (instead two pairs) of cephalic tentacles as well as the pharynx

and gut lumen ciliation as main characters differing *Ch. riedli* from *X. sanctigoulveni*. RIEGER *et al.* (1974) have described from North Carolina and Georgia another gastrotrich showing chordoid organ and included it to the genus *Chordodasys*, namely *Ch. antennatus*. The last species differs from *Ch. riedli* mainly in having no cuticular armature on the dorsal body side, in showing many long sensory processes along the body and in lacking caudal adhesive tubules. HUMMON (1982) has considered the name *Chordodasys* as a junior synonym of *Xenodasys*, but did not justify it. My observation of *X. sanctigoulveni* reveals further similarities between this species and gastrotrichs assigned to *Chordodasys*. The lateral cephalic tentacles have similar structure in *X. sanctigoulveni* and *Ch. riedli*. Both compared species have ventral "cirrata" tubules as well as digitate anterior adhesive tubules which originate from movable feet (the later interpreted mistakenly by SWEDMARK for *X. sanctigoulveni* as ventral muscles). Dorsal cuticular scales are similar in character and arrangement in *X. sanctigoulveni* and *Ch. riedli*. All these similarities give enough reason to consider both species as belonging to the same genus, in spite of the lack of data on the occurrence of chordoid organ, pharynx and intestine lumen ciliation as well as detailed organisation of genital system in *X. sanctigoulveni*. In addition, *Ch. riedli* and *Ch. antennatus* seem to be even more divergent than *Ch. riedli* and *X. sanctigoulveni* when morphological differences are taken in consideration. Thus, it is justifiable to regard the name *Chordodasys* Schöpfer-Sterrerr, 1969, as a junior synonym of *Xenodasys* Swedmark, 1967. The genus *Xenodasys* comprises three species described so far : *X. sanctigoulveni* Swedmark, 1967 (type species), *X. riedli* (Schöpfer-Sterrerr, 1969) n. comb. and *X. antennatus* (Rieger, Ruppert, Rieger and Schöpfer-Sterrerr, 1974) n. comb. The generic diagnosis of *Xenodasys* should remain as proposed by RIEGER *et al.* (1974) for *Chordodasys* since no addition might be offered in result of the present study. Also provisional affiliation of the genus with Turbanellidae as suggested by RIEGER *et al.* (1974) seems to be more justifiable than with Dactylopodolidae as proposed by HUMMON (1982). This view is supported by considerable similarity between the lateral tentacle of *X. sanctigoulveni* and that of *Dinodasys mirabilis*, which may be interpreted as clear homology.

Family THAUMASTODERMATIDAE Remane, 1926

Tetranchyroderma coeliopodium Boaden, 1963

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; not abundant.

DISTRIBUTION : Described from Northern Ireland (BOADEN, 1963*b*, 1966) and not found again. New for French fauna.

Body length of a mature specimen : 230 μm , while the length of pharynx is 75 μm . The anterior adhesive tubules are more numerous than in BOADEN's specimens and occur in number of 5 pairs (instead 2-4 pairs). Each of caudal foot bears two (compared with three) tubules, whereas exterior to them four pairs of tubes and between them four tubes are present, like in specimens from Northern Ireland. The ventral tubules, which are a specific feature of *T. coeliopodium*, number 3-4 pairs. The median arms of pentacres are of the same length that the remaining ones.

***Tetranchyoderma dragescoi* Swedmark, 1967**

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; in small number.

DISTRIBUTION : Known only from the station mentioned above (SWEDMARK, 1967).

Only some details may be added to the description of the animal, which at first glance differs from all other *Tetranchyoderma* species in showing peculiar body shape as well as unusually large and sparse tetrancres. Six pairs of anterior adhesive tubules being 10.5-11.5 μm long and arranged in an almost straight transverse row with narrow median space. The lateral adhesive tubules are more numerous than reported by SWEDMARK. They are 13-15 μm long and arranged in a paired ventro-lateral row, 23-24 in each (lateral tubules of caudal lobes excluded). The caudal lobe tubules, which number up to ten pairs, may be differentiated into two groups. External lobe margin tubules are thicker and longer than those inserted on inner margins (the length 11.5 μm compared with 8 μm). Some very thin (1.5 μm thick) and 20-28 μm long dorso-lateral cirri are present. Two pairs of them are issued from the trunk and one to two pairs from the caudal lobes. The spermatozoa show spiraled heads.

***Tetranchyoderma megastoma* (Remane, 1927)**

LOCALITIES : Manche : Roscoff, channel of Batz Island near Station Biologique; fairly abundant in fine, medium and coarse sand either clean or rich in organic detritus, between M.T.L. and M.L.W.N.T.; in the submarine sand-bank Trezen ar Skoden, not abundant. Atlantic : Bassin d'Arcachon, Eyrac beach, Pilat dune and Cap Ferret (Camp Américain); numerous in fine sand even in the black zone, between M.T.L. and L.W.L.

DISTRIBUTION : Baltic (FORNERIS, 1961), North Sea (FORNERIS, 1961; SCHMIDT and TEUCHERT, 1969), Manche, Eastern Atlantic, Mediterranean Sea (REMANE, 1927; WILKE, 1954; PAPI, 1957; BOADEN, 1965) as well as Indian Ocean (GANAPATI and CHANDRASEKHARA RAO, 1967; CHANDRASEKHARA RAO and GANAPATI, 1968a; CHANDRASEKHARA RAO, 1969). French coasts : Calvados (KAPLAN, 1958), Roscoff (SWEDMARK, 1956a) and Bassin d'Arcachon (SWEDMARK, 1956a; RENAUD-MORNANT and JOUIN, 1965; D'HONDT, 1971b).

***Thaumastoderma mediterranea* Remane, 1927**

LOCALITIES : Manche : Roscoff, channel of Batz Island and Aber; common and sometimes abundant in fine, medium and coarse sediment usually rich in detritus, on the level between M.T. and M.L.W.S.T.; submarine sand-bank Trezen ar Skoden occasionally.

DISTRIBUTION : Mediterranean Sea (REMANE, 1927; WILKE, 1954; SWEDMARK, 1956b; LUPORINI *et al.*, 1973; SCHROM, 1972). French coast : region of Marseille (SWEDMARK, 1956b).

Head tentacles of the specimens found correspond in shape with the typical tentacles reported for the species, however, they are slightly longer than usual. The anterior tentacle is

17-23 μm long, while the posterior one is 14-15 μm in length and has its maximum thickness reaching 5-6 μm . A spermatozoon, observed outside the body, was about 70 μm long and with a slender and non-spiraled head half as long.

***Thaumastoderma renaudae* sp. nov.**

(Fig. 6 a, b; pl. I d, e)

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; fairly abundant.

TYPE SPECIMEN : Holotype, collected on August, 12, 1982, deposited in MNHN Paris Collections (ref. n° UC 61).

ETYMOLOGY : The species is dedicated to Prof. Dr. Jeanne RENAUD-MORNANT (Paris).

DIAGNOSIS : *Thaumastoderma* with a pair of red elongated eye-spots. Both first, rod-shaped, and second, paddle-shaped, head tentacles unusually long, reaching 28-34 μm and 17.5-21 μm respectively. Two pairs of ventral adhesive tubules on the posterior trunk region. Four pairs of dorso-lateral cirri.

DESCRIPTION

The body length ranges from 196-250 μm . The body has typical shape of the genus. It bears two pairs of cephalic tentacles as well as four pairs of dorso-lateral cirri. The anterior tentacle is 28-34 μm long and 2.5 μm thick along the whole length. The posterior tentacle is in shape of a narrow paddle (fig. 6 b, pl. I e). Its length always extends a half of the anterior tentacle length and amounts usually 20-21 μm , rarely a little less (17.5-20 μm). The narrow tentacle base is 3.5-5 μm long and the widest blade basal region is 2.5-3 μm thick. A pair of red elongated eye-spots occurs at the basis of head tentacles. The cirri of the first, second and fourth pairs are similar in length (ranging from 28-48 μm in some specimens), those of the third pair are shorter and thinner, being 14-21 μm in length. Four pairs of anterior adhesive tubules form a row across the head. The tubules located centrally are shorter than the external ones (about 3 μm compared with 7-8 μm). The ventro-lateral tubules are thick and of variable length, reaching 19 μm . They are arranged in a paired longitudinal row which consists of 11-15 pairs of tubules. Two pairs of supplementary tubes distinctly ventral in location occur on the posterior body region. The tubules of external pair are at least twice as long as those of internal pair. There are six pairs of caudal tubules, three of them being issued from the feet and the three remaining ones located between feet. The foot length is 17-20 μm including 9-11 μm long tubules. The ventral ciliature consists of 21 transverse rows of cilia, 6 of them covering the pharyngeal region. Sensory cilia in number of about twelve pairs occur dorso-laterally. The dorsal and lateral body areas are covered with tetrancretes with arms 5.5-7 μm in length.

The pharynx is 63-74 μm long including the mouth cavity. Organization of reproductive system typical of the genus.

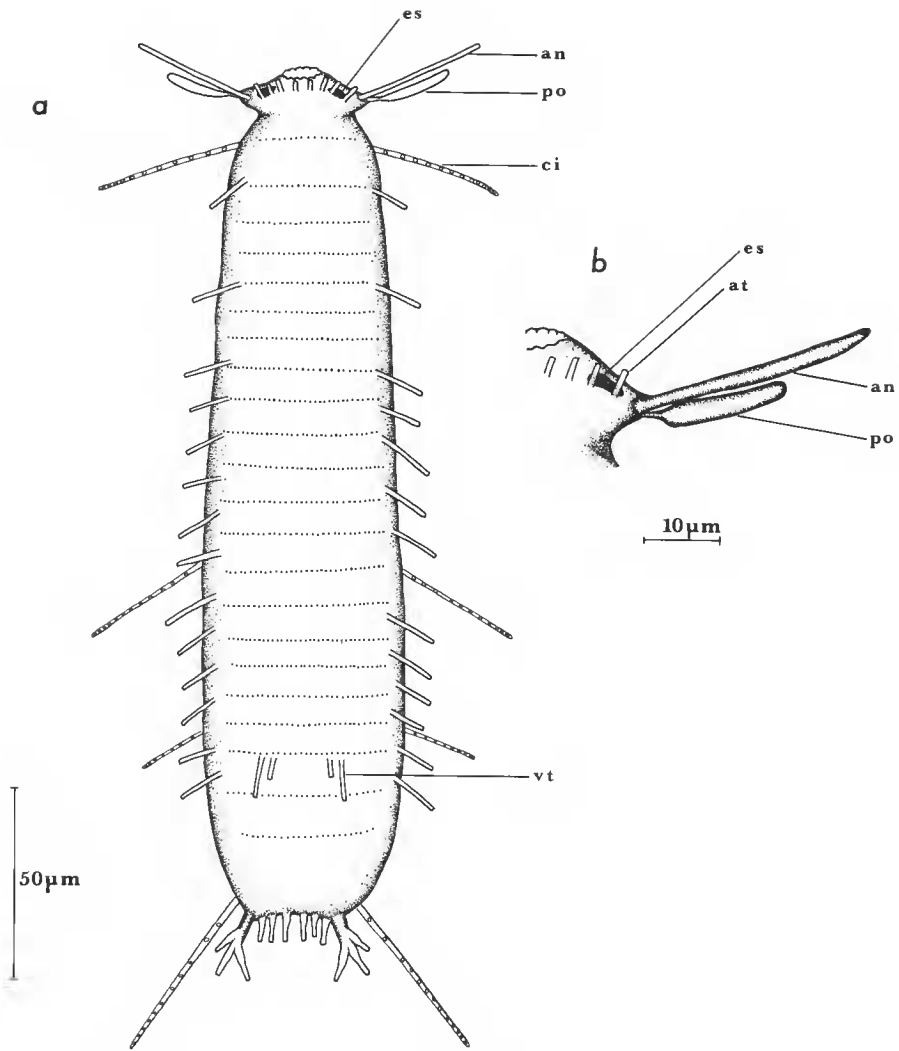


FIG. 6 a-b. — *Thaumastoderma renaudae* sp. nov. : a, general ventral view (locomotory cilia marked as points); b, ventral view of part of head with tentacles. an = anterior cephalic tentacle; at = anterior adhesive tube; ci = dorsal cirrus; es = eye-spot; po = posterior cephalic tentacle; vt = ventral adhesive tube.

DISCUSSION

The essential specific character of *Th. renaudae* sp. nov. is the shape of posterior cephalic tentacle. Amongst previously described species of the genus *Thaumastoderma*, *Th. cantacuzeni* Lévi, 1958 and *Th. ramuliferum* Clausen, 1965, have the posterior tentacle consisting of a primary basal vesicle with the secondary vesicle being issued from the anterior edge of the

primary one. *Th. swedmarki* Lévi, 1950 has two simple posterior tentacles and three remaining species (*Th. heideri* Remane, 1926, *Th. mediterranea* Remane, 1927, and *Th. arcassonnense* d'Hondt, 1965) have a single simple posterior tentacle. The posterior tentacle of *Th. renaudae* sp. nov. is single and simple, showing a peculiar, paddle-like shape and being considerably longer than the corresponding tentacles of the all remaining species (for most of the *Thaumastoderma*-species the length up to 10 μ m was reported with the only exception of *Th. mediterranea* where it may reach 15 μ m — see the previous subsection). The anterior tentacle of *Th. renaudae*, having a shape typical of the genus, is also unusually long (28-34 μ m compared with up to 23 μ m in remaining species — see the subsection on *Th. mediterranea* in the present paper). Moreover, the newly-described species has red eye-spots which contrast with all the species except for *Th. heideri*, and possesses ventral adhesive tubules, which are being different in this respect from all the species except for *Th. ramuliferum*.

Platydasys maximus Remane var. **celticus** Swedmark, 1955

LOCALITY : Manche : submarine sand-bank Trezen ar Skoden; abundant.

DISTRIBUTION (of the s.sp. *celticus*) : The region of Roscoff (SWEDMARK, 1955*b*, 1956*a*; SWEDMARK and TEISSIER, 1967) and continental shelf near Brest (RENAUD-MORNANT, 1971).

Some of the specimens found by myself are larger than reported by SWEDMARK, with a body length reaching 710 μ m. The head region is as wide as the trunk and even wider frequently, among young and mature animals. The lateral body margin denticulation is often observed not only on the anterior half of body but along the whole trunk. A high number of anterior, lateral and ventro-lateral adhesive tubules, being a peculiar feature of the form *celticus*, occur also in my specimens; but the posterior tubules are less numerous than those described by SWEDMARK, reaching the number of 5-6 pairs and usually showing a clear median space in their distribution.

Acanthodasys aculeatus Remane, 1927

LOCALITY : Manche : channel of Batz Island near to Station Biologique; not abundant in coarse sand at M.L.W.N.T.

DISTRIBUTION : A common species often reported from the seas around Europe. Found also on the Atlantic coast of USA (THANE-FENCHEL, 1970; HUMMON, 1974*b*; HOGUE, 1978) as well as Indian Ocean (Maldives : GERLACH, 1961; India : GANAPATI and CHANDRASEKHARA RAO, 1967; CHANDRASEKHARA RAO and GANAPATI, 1968*a*). French coasts : Pas-de-Calais (D'HONDT, 1968*a*), Calvados (KAPLAN, 1958), Roscoff (LÉVI, 1950; SWEDMARK, 1950, 1956*a*; D'HONDT, 1970) and Bassin d'Arcachon (D'HONDT, 1965, 1966*c*).

The species shows, according to numerous literature data, a considerable variability in the adhesive tubule number and distribution. My animals from Roscoff have 5-6 pairs of lateral

adhesive tubules, the anterior ones being the longest (29-31 μm). Caudal appendages bear two pairs of tubules placed distally and a pair located on their inner margins. Contrary to some earlier data (LÉVI, 1950; SCHROM, 1972), all caudal tubules are of the same size, being 11 μm long. The dorsal body side is densely covered with elliptic simple scales 4-5.5 μm long as well as spines varying in length (maximum 13 μm long) and originating from oval scales. The spined and simple scales are more numerous than is shown on the original REMANE's drawing and cover also the dorsal side of caudal appendages. Smaller spines and simple scales, 5 μm and 3.5 μm long respectively, occur on the ventral body side.

***Acanthodasys arcassonensis* sp. nov.**

(Fig. 7 a-d)

LOCALITIES : Atlantic : Petit-Nice and Banc d'Arguin, Arcachon; abundant in clean fine sand between H.W.L. and M.T.L.

TYPE SPECIMENS : Holotype, a mature specimen collected from station at Petit-Nice on September, 9, 1982, deposited in MNHN Paris Collections (ref. n° UC 62). Five paratypes are kept in the author's collection.

ETYMOLOGY : From the geographic name Arcachon, referring to the type-locality.

DIAGNOSIS : *Acanthodasys* with flexible body 560-740 μm in length. A pair of small round caudal lobes bearing short feet. Unusually dense body covering consists of elliptical simple scales and spiny scales, the later cross-shaped in optical section.

DESCRIPTION

Body length of freely swimming animals ranges from 560-740 μm . The body is elongated and much more flexible than usual amongst gastrotrichs. The anterior body region is as wide as the trunk and sharply truncate. The remaining part of body has parallel margins except for several folds and slightly rounded posterior region. A pair of small caudal lobes about 8 μm long and 8 μm wide usually occurs, however, the lobes may be rudimentary. There are 7-9 anterior adhesive tubules, 4-5.5 μm long and arranged in a broken line with their distal part directed postero-laterally. Lateral tubules are distributed in a paired row which begins usually at posterior part of pharynx region and is markedly interrupted at 3/5 of the trunk length. There are 0-2 pairs of tubules on the pharyngeal region and 13-16 pairs on the trunk, including 3 pairs of tubules occurring behind the separation. The tubules are 11-19 μm long except for the slightly shorter (9-12 μm) tubules of the posterior group. There are three pairs of thicker and shorter tubules (5-9 μm long) located on the caudal lobes. Two pairs of them form usually short feet which are up to 18 μm long (the tubules included).

The whole body, including caudal lobes, is covered with cuticular structures which are of the same kind that those of *A. aculeatus* Remane. However, the armature is much more dense and renders the body less transparent than in other gastrotrichs. The dorsal, lateral and ventro-lateral body sides are covered with oval spined scales and elongated simple scales. Amongst both spined and simple scales, two distinct categories of size can be distinguished. Large-sized spines are usually 8-9 μm long, and occasionally 11 μm , whereas their basal scales

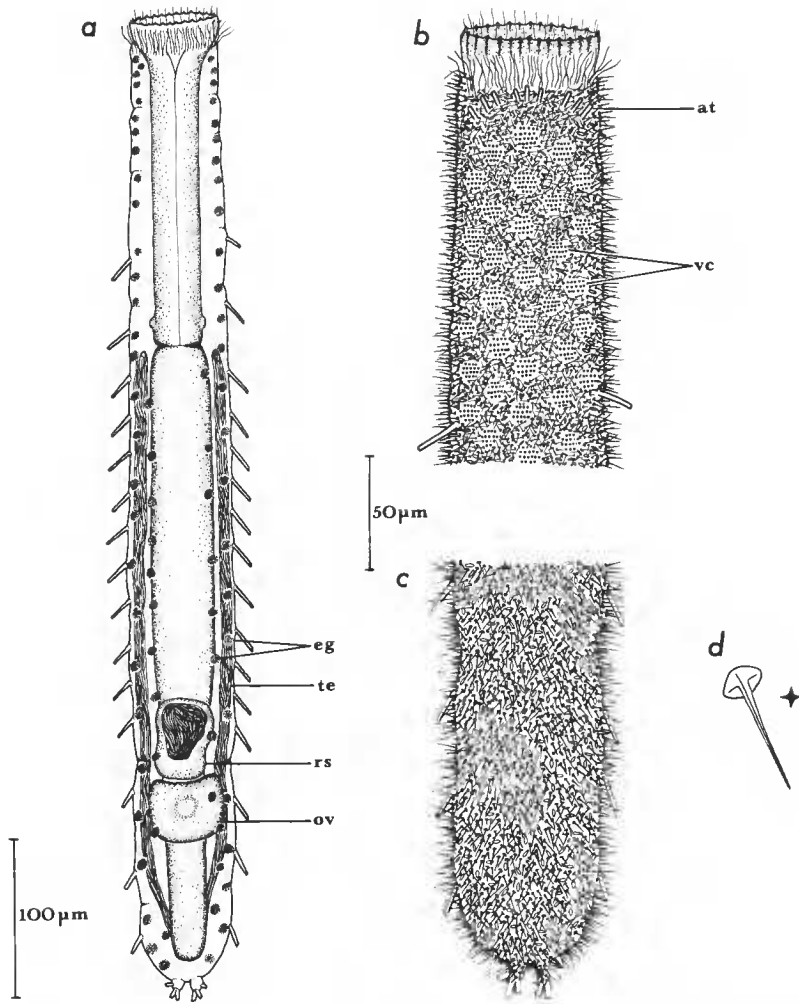


FIG. 7 a-d. — *Acanthodasy arcassonensis* sp. nov. : a, general dorsal view (cuticular armature not marked); b, ventral view of anterior body region (locomotory cilia marked as points); c, dorsal view of posterior body region; d, spined scale (an optical spine section on the right). at = anterior adhesive tube; eg = epidermal glands; ov = ovum; rs = receptaculum seminis filled with sperm; te = testes and vasa deferentia; vc = areas with locomotory cilia.

have dimensions of $4 \times 2.5 \mu\text{m}$. Small-sized spines are $4\text{-}5 \mu\text{m}$ long. All the spines are cruciform in optical section; the four spine blades forming lines on the scale enlarged base (fig. 7 d). The ventral body side is densely covered with spined and simple scales of the same kind as observed on the rest of body, but 4-5 times smaller. The maximum length of ventral spines is $2.5\text{-}2.8 \mu\text{m}$. Separate areas bearing ventral cilia are free from cuticular armature. The ventral ciliation consists of 5-7 irregular longitudinal alternating rows of such areas, the later bearing about twenty cilia each. The actively moving cilia form also a compact crown around

the mouth. The epidermal glands are usually arranged in paired dorsal and dorso-lateral rows running along the whole body. There are 10-20 pairs of glands on the whole pharyngeal region and 17-30 pairs on the trunk. The glands have amorphous contents or consist of relatively large vesicles.

The mouth is terminal and surrounded with a thick muscle which makes possible to partially close or open it wider than the body width. Apart from a ring of cilia, the mouth is furnished with short and rigid bristles located at its edge between small protuberances (fig. 7 b). The pharynx is 210-230 μm long with pores located posteriorly. Due to very dense cuticular covering the anatomy of reproductive system was hardly observable. A paired testes — vasa deferentia complex contained very long spermatozoa. Following the nomenclature of RUPPERT (1978), the caudal organ and cluster of foreign sperm in the frontal organ have been also observed.

The animal swims fast and shows impetuous body movements, in a turbellarian way.

DISCUSSION

So far only one species : *A. aculeatus* Remane, 1927, has been described in the genus. RUPPERT (1978) has mentioned the names of five further species to be described in the near future i.e. *A. diplodasyoides*, *A. tetranchyrodermatoides*, *A. vermiformis*, *A. thrinax* and *A. platydasyoides*. The general body habit and cuticular armature of *A. tetranchyrodermatoides* have been even shown on scanning micrographs in the paper cited as well as the genital system of *A. thrinax* has been described and figured in details. All the names given by RUPPERT including *A. tetranchyrodermatoides* and *A. thrinax* should be however considered as *nomina nuda*, since no morphological descriptions of these species are available so far. *A. arcassonensis* sp. nov. shows several similarities with *A. aculeatus* i.e. body size, presence of both elliptical simple scales and spined scales as well as differentiation in size between dorsal and ventral cuticular structures. It differs, however, from the compared species in lacking large caudal furca, and having rudimentary caudal lobes. Moreover, the body covering of *A. arcassonensis* sp. nov. is much more dense than that of *A. aculeatus* and all its spines show a clear cross in optical section. Also more motive and flexible body differentiates the newly-described species from REMANE'S type-species.

Diplodasys ankeli Wilke, 1954

(Fig. 10 a)

LOCALITIES : Manche : submarine sand-bank Trezen ar Skoden; abundant. Callot Island; in small number among a coarse clean gravel at M.T.L.

DISTRIBUTION : Norway (CLAUSEN, 1965b, 1967), Western Swedish coast (SWEDMARK and TEISSIER, 1967), Northern Ireland (BOADEN, 1966), Manche, Eastern Atlantic, Mediterranean Sea (WILKE, 1954; BOADEN, 1965); Atlantic coast of USA (HUMMON, 1968, 1974b, 1975; RIEGER, 1976) and Galapagos (SCHMIDT, 1974, *D. a. pacifica*). French coasts : Trezen ar Skoden (SWEDMARK and TEISSIER, 1967), continental shelf near Brest (RENAUD-MORNANT, 1971) and Marseille (SWEDMARK, 1956b).

The body is 315-350 μm in length. Head, neck and trunk region are divided by two distinct constrictions. The trunk distal part is lobate. The lobe is 9 μm in length and 20 μm wide; it bears a pair of feet, each being provided with two adhesive tubules, a pair of tubules placed between feet and two other pairs located outside the feet. The length of caudal tubules ranges from 6.5 μm to 9 μm .

Dorsal part of body covered with plates, the later having hollows located somewhat anterior to the center and many small ornaments located mainly between hollow and anterior plate edge (fig. 10 a). There are 19-23 plates in the median longitudinal row. The “*Diplodasys*”-spines occur in a paired lateral row. There are 30-35 pairs of them in all, including two pairs on the head, four pairs on the neck and 24-29 pairs on the trunk. The spines are 10.5-16 μm in length, the more posterior ones tending to be a little longer than the anterior ones. The anterior adhesive tubules are randomly distributed along two transverse rows which do not show any median space. A total of 26 anterior tubules 7 μm in length are present. There is a pair of lateral adhesive tubules in the posterior trunk region.

The ventral body side is covered with plates having weakly marked edges. Depressions similar to those which occur in the dorsal plates were detected, whereas the small ornaments seem to be absent.

***Diplodasys minor* Remane, 1936**

(Fig. 10 b)

LOCALITY : Submarine sand-bank Trezen ar Skoden; in small number.

DISTRIBUTION : North Sea (REMANE, 1936; CLAUSEN, 1967); Manche, Eastern Atlantic, Mediterranean Sea (WILKE, 1954; LUPORINI *et al.*, 1971) and Bahamas (RENAUD-DEBYSER, 1963*b*). French coasts : ROSCOFF (LÉVI, 1950; SWEDMARK, 1955*b*; 1956*a*); Bassin d’Arcachon (RENAUD-DEBYSER, 1963*a*, *b*; RENAUD-MORNANT and JOUIN, 1965; d’HONDT, 1971*b*).

The body which is 270 μm in length, is divided into the head, neck and trunk regions, however, with constrictions being less marked than in *D. ankei*, *D. caudatus* sp. nov. and *D. swedmarki* sp. nov. The trunk posterior part is in form of a lobe being 10 μm long and 20 μm wide and bearing small feet, each with two adhesive tubules (8 μm in length).

The dorsal body part is covered with plates having small hollow at their front or center and numerous radial furrows going from the hollow to the sinuous posterior edge. There are 26 plates in the median longitudinal row. Laterally, 40 pairs of “*Diplodasys*”-spines occur, two of them being placed on the head, and 38 ones on the two weakly-separated remaining areas. The spines are 8.5 μm long. A pair of very thick and 5-10 μm long lateral adhesive tubules occurs on the posterior trunk region.

***Diplodasys caudatus* sp. nov.**

(Fig. 8 a-c, 10 c; pl. I g)

LOCALITY : Manche : Roscoff, channel of Batz Island at the mouth of Aber; single specimen in medium sand at M.T.L.

TYPE SPECIMEN : The holotype has not been designated ; a negative of micrographs taken from the Nomarski interference optics microscope is kept in the author's collection (ref. n° 212/82).

ETYMOLOGY : From the latin *caudatus* = having a tail, referring to a large caudal lobe.

DIAGNOSIS : *Diplodasys* with slender body, 460 μm in length. Two neck constrictions present. Large protruding caudal lobe with about 11 adhesive tubules but without feet. 37-40 pairs of lateral "Diplodasys"-spines including only one pair on the head. Five longitudinal rows of dorsal plates having hollows posteriorly off center and five to six drop-shaped ornaments between the hollow and posterior edge (fig. 8 b, 10 c).

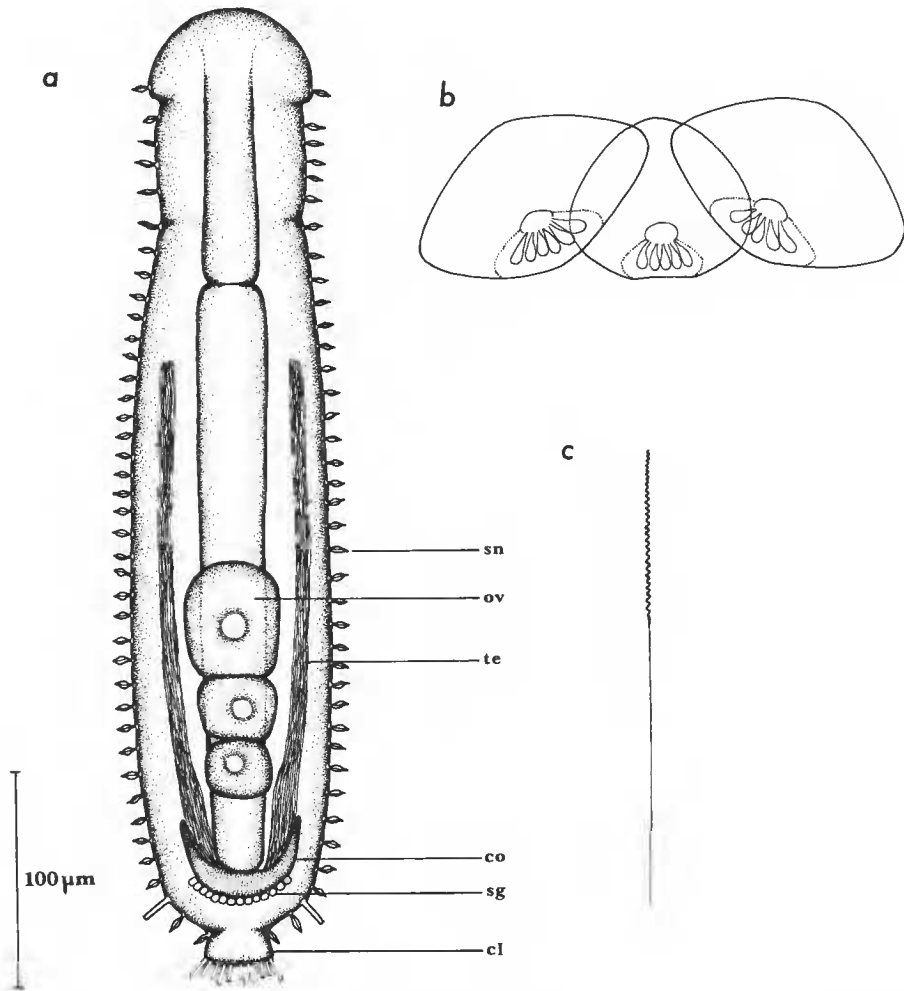


FIG. 8 a-c. — *Diplodasys caudatus* sp. nov. : a, general view, from dorsal ; b, a median and two overlapping dorsal plates ; c, spermatozoon. cl = caudal lobe ; co = caudal organ ; ov = ovum ; sg = segmented organ of unclear function ; sn = lateral spine of "Diplodasys"-type ; te = testes with vasa deferentia.

DESCRIPTION

The body is 460 μm in length. Body slender with two constrictions typical of most known *Diplodasys* species. A large protruding caudal lobe is 16 μm and 27 μm wide.

Lateral body margins provided with 37-40 "*Diplodasys*" type spines; the first of them being located on the head, 4-5 next ones on the neck, 30-32 ones on the trunk and two last ones posteriorly, between a large postero-lateral adhesive tube and the caudal lobe. The spines are 7 μm in length with exception of the last pair which is a little shorter; shape and round basal scales as in *D. ankei*, *D. minor* and *D. swedmarki* sp. nov. The paired postero-lateral adhesive tubule is 12.5 μm long. The posterior margin of caudal lobe bears 11 adhesive tubules distributed rather irregularly. The length of external caudal tubules is 9 μm , whereas that of the remaining ones ranges from 4 μm to 8 μm .

The dorsal part of body is covered with plates having a peculiar surface pattern and being arranged in five longitudinal rows. The hollow is located behind the plate center whereas between the hollow and the posterior plate margin five to six drop-shaped smaller ornaments occur (fig. 8 b, 10 c).

The anatomy of the reproductive system is fully in accordance with the description by RUPPERT (1978) for *Diplodasys*. The paired testis contains 25 μm long spermatozoa with spiraled and 12 μm long heads (fig. 8 c). The caudal organ lies posteriorly along a transversally-located segmented structure of unclear function.

For discussion see the subsection on *D. swedmarki* sp. nov.

***Diplodasys swedmarki* sp. nov.**

(Fig. 9 a-c, 10 d)

LOCALITY : Submarine sand-bank Trezen ar Skoden; in small number.

TYPE SPECIMENS: Holotype, a mature specimen collected on July, 19, 1982, deposited in MNHN Paris Collections (ref. n° UC 63). A paratype is kept in the author's collection.

ETYMOLOGY : The species is dedicated to Bertil Gregor SWEDMARK (1918-1975).

DIAGNOSIS : *Diplodasys* with stumpy body 490 μm long, two neck constrictions and a small caudal lobe with two pairs of adhesive tubules. Large "*Diplodasys*" lateral spines in number of 32-34 pairs, including 3 pairs on the head. Dorsal plates in five longitudinal rows along the whole body and two additional ones on the mid-trunk region. Plates of five main rows with weak hollows from front to center, plates of additional rows without hollows but with soft (? sensory) central processes.

DESCRIPTION

The body of mature specimens is 490 μm in length. It is larger and wider than that of the other European *Diplodasys* species. Like *D. ankei* and *D. caudatus* sp. nov., two distinct constrictions divide the body into head, neck and trunk. The trunk terminates into a caudal lobe 12 μm long and 32 μm wide.

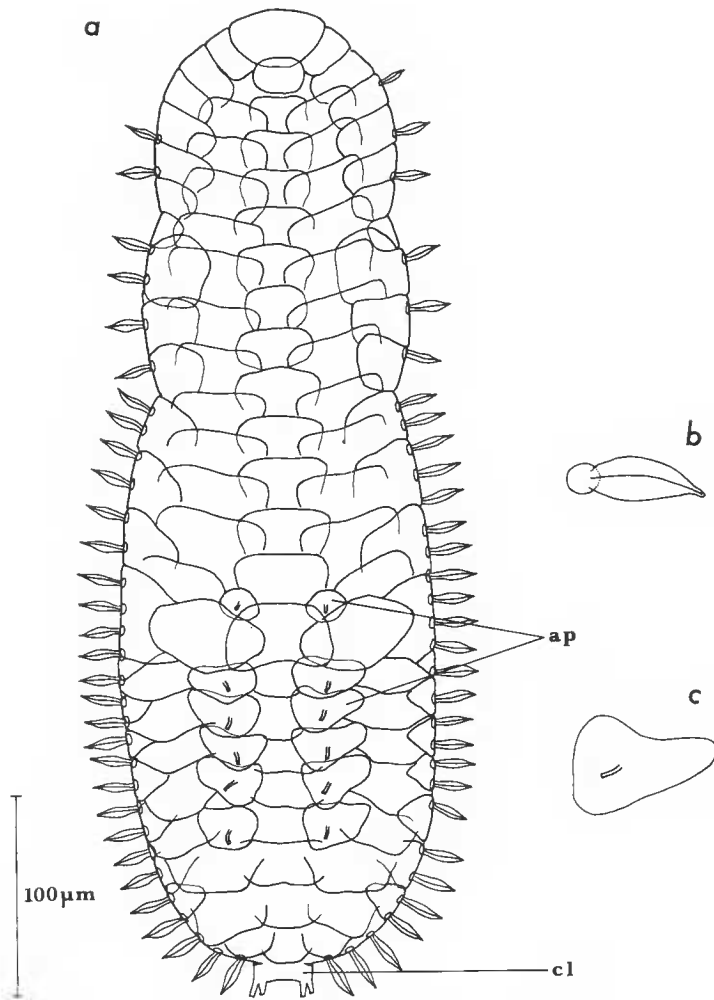


FIG. 9 a-c. — *Diplodasys swedmarki* sp. nov. : a, dorsal view of animal; b, spine of “*Diplodasys*”-type; c, “additional” plate with sensory (?) processes. ap = “additional” plates; cl = caudal lobe.

Each of the lateral body margin is provided with a row of spines of the “*Diplodasys*”-type, i.e. similar to those which occur in *D. ankei*, *D. minor*, *D. remanei* and *D. caudatus* (fig. 9 a, b). The row consists of 32-34 such spines, including three on the head, 3-4 on the neck and 26-27 on the trunk. The spines are relatively large ($17-20\mu\text{m}$ long) and with lamellae $5.5-7.5\mu\text{m}$ high. Only two pairs of adhesive tubules, $5\mu\text{m}$ in length, occur on the caudal lobe.

The dorsal body part is covered with plates which are arranged in five longitudinal rows running along the whole body, and two additional ones which occur on the mid-trunk region and are overlapping on each side of the median row. There are 23 plates in the median row,

and 6-7 in the additional rows. The first pair of additional plates occurs a little behind the fourteenth median one. All these plates have a central soft and thick process (presumably sensory in function) and no hollow; the first or two first pairs of them are oval, whereas all remaining ones are more or less heart-shaped (fig. 9 a, c). The plates which belong to five main longitudinal rows have weakly marked hollows which occur on the plate centre or slightly more in its front. Apart from the hollow plate surface is smooth or shows very fine ornamentation (fig. 10 d). Contrary to *D. ankei*, whose ventral plates have edges hardly separated from the cuticle, the ventral plates of *D. swedmarki* show distinct edges.

The anatomy of reproductive system is as described by RUPPERT (1978) for the genus.

DISCUSSION

Four following species of *Diplodasys* have been described so far: *D. platydasyoides* Remane, 1927, *D. minor* Remane, 1936, *D. ankei* Wilke, 1954 and *D. remanei* Chandrasekhara Rao and Ganapati, 1968b. The first one, whose description by REMANE was not supplemented by picture, has tetrancres on the lateral body margins, whereas the other mentioned species show peculiar lateral spines arising from the round basal scale and having long two-sided lamella. *R. remanei* which has been described from India, differs from *D. ankei* and *D. minor* in having a larger (800 μm long compared with 192-450 μm) much more slender body bearing relatively smaller and more numerous dorsal plates. Apart from the most common European species, i.e. *D. ankei* and *D. minor*, I found in Roscoff two other species which differ from them in many characters. The specimens of *D. ankei*, *D. minor*, *D. caudatus* sp. nov. and *D. swedmarki* sp. nov. show also similarities. The body of all of them have two constrictions dividing it into head, neck and trunk regions; all of them show also the presence of caudal lobe. The constrictions are the best marked in *D. ankei* and *D. swedmarki*, whereas the less pronounced in *D. minor*. All four species have a paired lateral row of lamellated spines as well as the same pattern of dorsal covering of five to seven longitudinal rows of plates. In all the species, the plates belonging to the median row are bilaterally symmetrical being almost round on the neck area and becoming wider forward and backward. The plates located in the other rows are clearly asymmetrical. Another feature in common is the presence of a pair of lateral

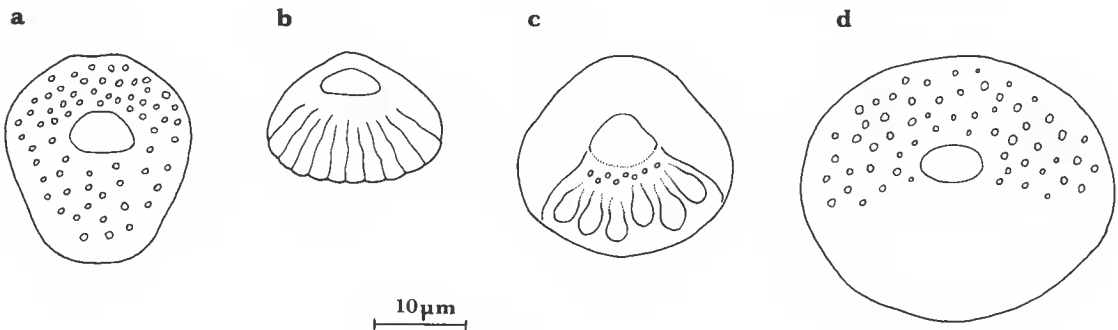


FIG. 10 a-d. — Comparison of eighth or ninth median plate in four *Diplodasys* species found in Roscoff; a, *D. ankei*; b, *D. minor*; c, *D. caudatus*; d, *D. swedmarki*.

adhesive tubules on the rearmost part of trunk (in *D. swedmarki* usually weakly developed). These tubules may occasionally be overlooked since they are often covered with lateral spines. The main characters to differentiate *D. ankei*, *D. minor*, *D. caudatus* and *D. swedmarki* are : the relative body width, the surface pattern of dorsal plates, the number of plates in the median longitudinal row, the number, distribution and size of lateral spines as well as the number and arrangement of caudal lobe tubules. Considering asymmetry of dorso-lateral plates as well as variability of plate shape along the body, the eighth or ninth plate from the median row being placed on the mid-neck region was taken for comparison (fig. 10 a-d). The round plate shape is almost similar in all compared species, however, it shows all specific features on the surface pattern such as location of hollow and type of supplementary ornamentation. The main differences between the four compared species are given in table 1.

TABLE 1. — Comparison of features of four *Diplodasys* species found in Roscoff during present study.

N°	FEATURE	<i>D. ankei</i>	<i>D. minor</i>	<i>D. caudatus</i>	<i>D. swedmarki</i>
1	Body length	315-350 μm	270 μm	460 μm	490 μm
2	Relative body width (body length : neck width ratio)	4.5 : 1	3.1 : 1	6.5 : 1	3.8 : 1
3	Number of adhesive tubules on caudal lobe	10	4	11	4
4	Number of dorsal plates in median row	19-23	26	?	24
5	Shape and ornamentation of median neck plate	Hollow in the center or in front of usually many small ornaments in front and behind hollow	Hollow in anterior plate region; many radial furrows between hollow and posterior edge, the later often sinuous	Hollow in the plate center; 5-6 drop-shaped ornaments between hollow and posterior edge	Small hollow a little ahead of center; many fine ornaments mostly in the anterior plate region
6	Number of " <i>Diplodasys</i> " type spines per side	30-35	40	37-40	33-35
7	Spine length	13-16 μm	8.5 μm	7 μm	17-20 μm

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PLATE I

- A-C — *Xenodasys sanctigoulveni* : A, general view ; B, ventro-lateral part of head with lateral tentacle ; C, dorsal plates with (?) sensory processes.
D-E — *Thaumastoderma renaudae* sp. nov. : D, general view ; E, part of head with tentacles.
F — *Dinodasys mirabilis*, general view.
G — *Diplodasys caudatus* sp. nov., general view.

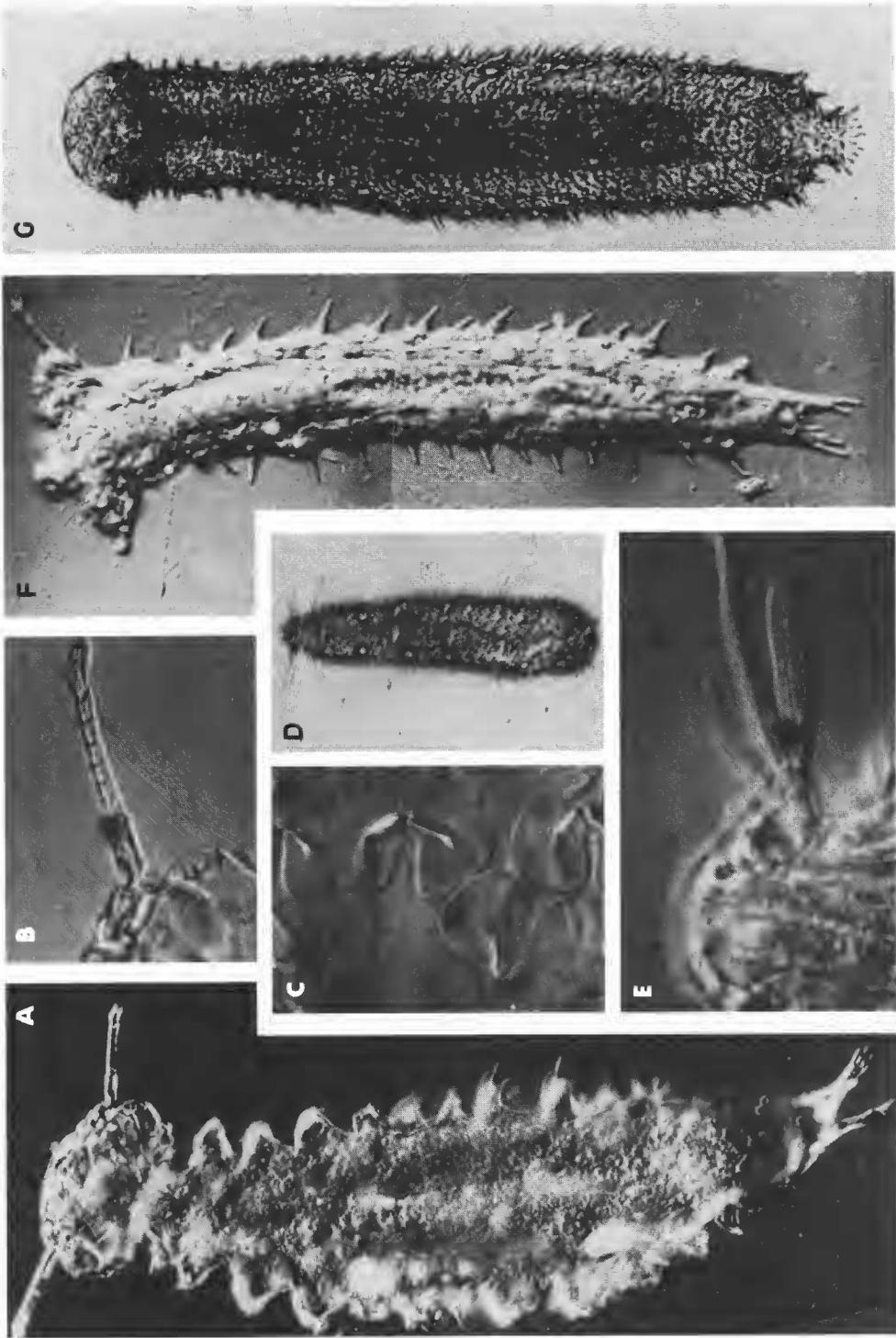


PLATE I